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JANUARY 1984 THE NAVAL AVIATION SAFETY REVIEW

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An Editorial . . . Brought to you by the letter "S"

During the last months of 1983, we received several packages of aviation safety articles from various commands. Each package contained an average of five articles varying widely in topic, length and quality. The main reason for this year-end splurge was the CNO's' safety "S" award competition. The applications for these awards get written around year's end, and having safety articles published is a factor in the selection. Since the nominations are reviewed here at the Safety Center, the most advantageous place to submit them is Approach.

These safety writing campaigns are a good idea for improving a command's real safety posture. The task of writing requires that the author research, review and clarify his knowledge of his subject. When the subject is aviation safety, that includes a careful look at how safe *he* is. Article writing campaigns can also give safety officers and commanding officers a unique form of feedback about the state of their safety programs. Potential safety hazards in a command can be found by "reading between the lines" of submitted articles. Writers draw from their own experience instinctively, in ways they may not realize. Other benefits are less immediate but just as important.

Passing on lessons learned and new ideas helps the safety effort throughout the Navy. It also encourages other commands to do the same. Just having the command's name in print is good for its morale and reputation. But all of these factors depend on the quality, not the quantity of the writing. Here are some suggestions for starting a quality safety writing campaign in your command and avoiding some of the pitfalls:

Make safety writing a command priority and an ongoing program. In-house safety publications, writing contests and direct assignments of topics can get the momentum started. And don't wait until the end of the year! Approach usually has a three-month submission-to-publication lag, which has caused more than one command's articles to miss their safety "S" deadline. Also, a year-round program doesn't suffer from the "forced writing" problems of a last minute campaign.

Make sure all hands are aware of the personal benefits of safety writing. Everyone has ideas on ways that things can be done better, but most feel a sense of frustration about not being able to communicate them directly to those who can effect changes. Having your ideas published is a way to "tell the world." They should also know that most COs regard professional writing as worthy of favorable comment on fitness reports. Just having a byline in Approach is a good way to bolster one's professional reputation. But regardless of the motivation, seeing one's own writing published generates a sense of personal satisfaction that is well worth experiencing.

Find the potential authors and topics in your command. The most successful Approach articles are first person narratives about actual incidents, but good articles can take many forms. Is a member of your command an expert on a safety subject? Does your command have a unique approach to solving a safety problem? Has your command been in any unusual operational environments lately that presented safety problems? If so, your command has articles just waiting to be written. Don't overlook those readyroom "comedians" either. Safety can be a dull topic, so Approach places a priority on articles that can provide comic relief while still getting a constructive message across.

Send for a copy of our Contributor's Guide, which will give you some guidelines for writing and submitting safety articles and feel free to contact me for assistance. With a little command attention, professional writing can become a regular part of your safety program.

Good luck on that safety "S"!

Lt. John Flynn
Editor

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inside approach

Vol. 29 No. 7

This month's cover is an F-14 RIO's eye view of a wingman in close formation. Photographer unknown.

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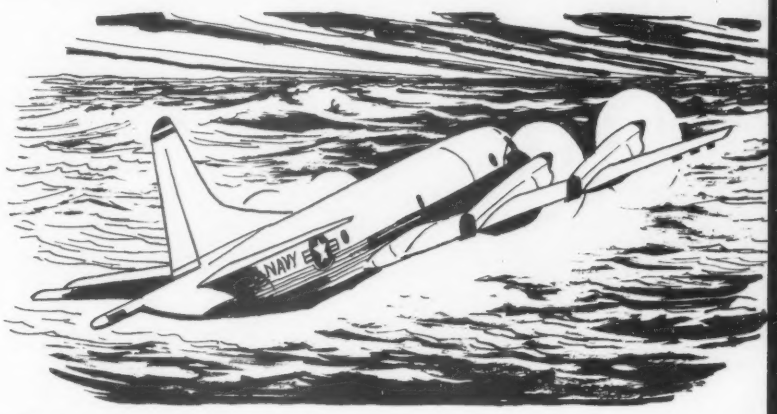

Commodore Jerry C. Breast, Commander, Naval Safety Center
Capt. H.A. Petrich, Chief of Staff
Capt. J.P. Smith, Director, Aviation Safety Programs
Cdr. C.E. McCaskill, Head, Safety Publications
Lt. John M. Flynn, Editor

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SUNBIRD SEVEN-THREE-SEVEN had just departed runway 36 at the Washington National Airport in a moderate to heavy snowstorm with low visibility. The takeoff roll was longer than usual. Comments in the cockpit indicated that something didn't quite feel right. After finally reaching rotation speed, the aircraft was slow to accelerate and failed to achieve an adequate climb prior to impacting the heavily traveled 14th Street bridge located about 4,500 feet from the departure end. It then plunged into the icy Potomac. The flight data recorder revealed that the maximum airspeed obtained was 147 knots, followed by airspeed decay as the aircraft reached a maximum altitude of 337 feet prior to losing altitude. The consequences of the catastrophe were soon apparent with 74 of the 79 occupants killed by impact or drowning along with four others in autos on the bridge.

Undoubtedly such a real life tragedy serves to reinforce our profound respect for some of winter's elements, particularly those that can have a devastating effect on aircraft performance. With the upcoming winter weather upon us, perhaps a review of various fundamentals will serve to better prepare us for some of the inherent

Hazards of Winter Operations

By Lcdr. Joseph F. Towers
VR-57

INTRODUCTION

The majority of naval aircraft are reasonably well-endowed with deicing and/or anti-icing equipment. They can safely operate in relatively light to moderate icing conditions, but only for a limited time. Fortunately, most naval aviators can prevent icing mishaps through positive avoidance. However, there comes a time or two in each of our aviation careers that aircraft structural icing, when not properly dealt with, has the capability of severely hindering the aerodynamic performance of our aircraft — regardless of type!

Every naval aviator has undoubtedly heard of aircraft structural icing and other associated hazards of winter weather. However, the following may serve to enhance our recall.

AIRCRAFT ICING

Aircraft structural icing is the accretion of ice on the exposed surfaces caused by the impingement of supercooled water droplets. This adhesion normally involves liquid moisture and subfreezing temperatures.

TYPES OF STRUCTURAL ICING

Frost. Frost is a deposit of a thin layer of ice that forms on the exposed surfaces of parked aircraft. Frost occurs when the surface temperatures are below freezing. This deposit of ice forms primarily during night radiational cooling in a manner similar to the formation of dew and frost on the ground. Inflight, when descent is made from subfreezing air into a warm, moist layer, frost may also form.

The effects of frost are perhaps more subtle than the effects of ice on the aerodynamic characteristics of the wing. The accumulation of a hard coat of frost on the upper wing surface provides a texture of considerable roughness. While the basic shape and aerodynamic contour is unchanged, the increase in surface roughness increases skin friction and reduces the kinetic energy of the boundary layer. The net result is an increase in drag and reduction in lift. This fine crystalline ice formation is often barely visible. However, it can easily distort the normal air flow over wings and control surfaces enough to adversely affect the takeoff characteristics of an aircraft. (See Figure 1.)

WARNING

If frost is severe enough, it is possible that the aircraft may not become airborne due to the premature stalling of the wing prior to rotational speed (V_r).

Clear Ice. Clear or glaze ice is considered to be the most serious of the various forms of aircraft structural icing. It is formed by the slow freezing of large supercooled water droplets on exposed surfaces. These supercooled droplets have a tendency to spread out and assume the shape of the surface on which they freeze. As a result of this spreading, few air bubbles are present and the ice appears to be clear.

The large water droplets which produce clear ice are encountered most frequently in cumuliform clouds. Clear ice adheres tenaciously to exposed surfaces and is relatively hard to remove.

Hazardous clear icing is also frequently encountered in areas of freezing rain. Freezing rain occurs when rain falls from the overrunning warm air, which is slightly above freezing, into the cold air, which is slightly below freezing. The rain becomes supercooled as it falls through the cold air and will freeze when it comes into contact with aircraft surfaces. Thus, an aircraft flying through an area of freezing rain can rapidly acquire a coat of heavy ice. Freezing rain may be encountered while flying in the colder air mass of

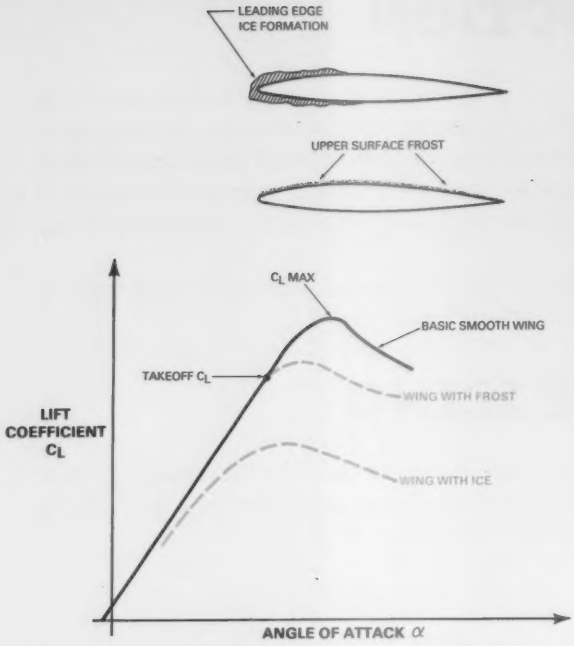


Figure (1) illustrates the general typical effects of frost and ice formation on the lift characteristics.

both warm and cold fronts. It occurs most frequently, however, in warm fronts.

Rime Ice. Rime ice is formed by the instantaneous freezing of small supercooled water droplets upon impact. Since these supercooled droplets adhere in a spherical shape to an aircraft, air is trapped within the ice. This gives it an opaque appearance and renders it brittle in nature. Rime ice does not spread easily over an aircraft surface and is found primarily along the leading edges of an airfoil.

Rime ice is encountered most frequently in stratiform clouds. By comparison to clear ice, it builds up slowly and is relatively easy to break loose by conventional methods.

Rime and clear ice frequently occur together. For example, freezing drizzle usually produces a combination of rime and clear ice. The most severe clear icing conditions occur at temperatures between 0° C and -10° C in cumuliform clouds and freezing precipitation. At temperatures below -10° C, either all rime ice or mixed rime and clear ice might occur. Frontal situations cause almost all of the severe icing conditions experienced in terminal areas.

ICING PARAMETERS

The principal factors that affect aircraft accumulation are:

- Temperature
- Droplet size
- Liquid water content
- Exposure time

The temperature of the air (or airfoil surface or water droplets) must be below freezing (0° C/32° F) and above -40° C. When the outside air temperature (OAT) is at -40° C or below, the atmosphere is not capable of containing moisture in the liquid state. Any atmospheric moisture existing under these conditions will be in the solid form of ice. Most structural icing occurs between 0° C and -25° C. Frozen particles such as ice crystals, snow and pellets do not normally adhere to aircraft surfaces in flight and they present no accumulation hazard.

Ice accumulation is directly proportional to the amount of supercooled moisture in the atmosphere. Consequently, structural icing forms more rapidly in dense clouds than in thin ones.

Large water droplets adhere and accumulate more rapidly on an exposed surface in flight than smaller droplets which tend to follow the airstream as it is deflected by the airfoil.

As speed increases, ice rate of accumulation increases up to approximately 400 knots. Above this speed, ice formation gradually decreases due to skin friction heating. (This aerodynamic heating is the temperature rise resulting from adiabatic compression and friction as the aircraft moves through the atmosphere. The amount of heating varies primarily with speed and altitude. Icing will only occur if the amount of supercooling exceeds the countering amount of aerodynamic heating. Dissipation should result when the total air temperature (outside air temperature plus aerodynamic heating reaches +10° C or higher).

As the exposure time increases, so does the amount of accumulation.

The amount of ice buildup is proportional to the frontal

size of the collecting surface. Normally, the thicker the leading edge of an airfoil, the greater the accumulation.

AERODYNAMIC ICING PENALTIES

Airfoil surfaces were designed and manufactured to certain desired specifications. Structural icing distorts the shape of airfoils, control surfaces and the basic airframe. The net result is an:

- increase in drag
- reduction of lift
- reduction in performance
- increase in weight
- increase in fuel consumption
- increase in stall speed (V_S)

In the final analysis, aircraft structural icing can be extremely hazardous; it can adversely affect aircraft performance, and it can place its operation outside the designed safe flight envelope.

NOTE

Ice deposits of one-half inch on the leading edge of certain airfoils can reduce their lift by nearly 50 percent, increase drag by an equal percentage and greatly increase stall speed.

ICE ACCUMULATION CLASSIFICATION

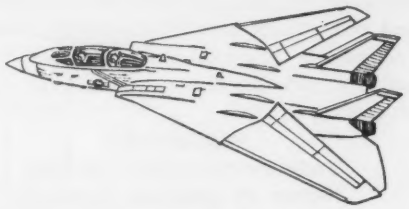
The following definitions apply to rates of accumulation for pilot reporting classifications.

Trace — icing becomes perceptible, not hazardous unless encountered for an extended period of time.

Light — rate of accumulation may create a problem if flight is prolonged. Deicing/anti-icing equipment is sufficient to reduce or eliminate buildup when utilized. Ordinarily, no hazard is presented.

Moderate — rate of accumulation is such that even brief encounters can become potentially hazardous. The use of deicing/anti-icing equipment or diversion is required.

Severe — a high rate of accumulation where deicing/anti-icing equipment is inadequate to reduce or control the hazard. Immediate diversion is necessary.



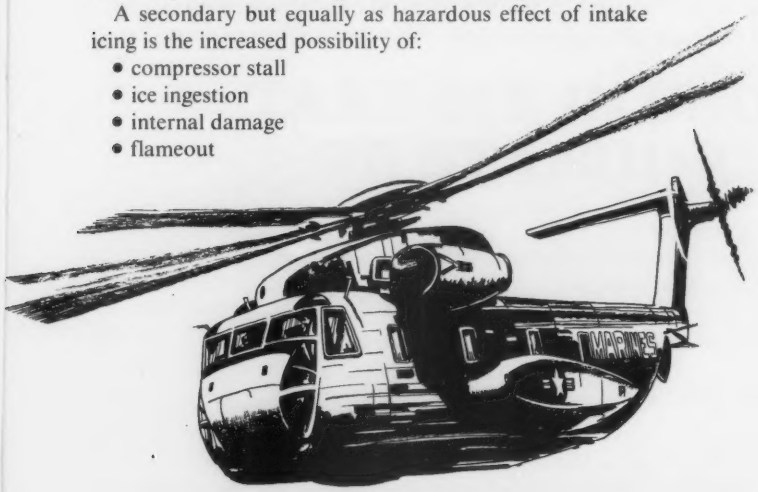
JET ENGINE INTAKE ICING

Jet engines are susceptible to icing. The engine cowling, bullet, inlet guide vanes, first stage compressor blades, etc. can collect ice under the same general conditions that cause exterior icing.

A hazard exists since icing of this type can result in a reduction in inlet airflow, engine internal pressure, net efficiency and the resulting thrust ultimately produced.

A secondary but equally as hazardous effect of intake icing is the increased possibility of:

- compressor stall
- ice ingestion
- internal damage
- flameout



Note

Conditions exist under which jet engine icing can occur without wing icing. Icing occurs when the adiabatic expansion reduces the air temperature in the engine inlet; ingested water droplets which impinge on the engine inlet components will freeze. This phenomenon may occur during ground and takeoff operations, when the aircraft velocity is low and engines are operating at high thrust settings. This condition can exist up to +5°C in visible liquid moisture (drizzle, fog, etc.) or when the dew point is within 3°C of this ambient temperature range.

Continued

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Engine Pressure Ratio (E.P.R.) is the ratio of engine turbine exit pressure to compressor inlet pressure.

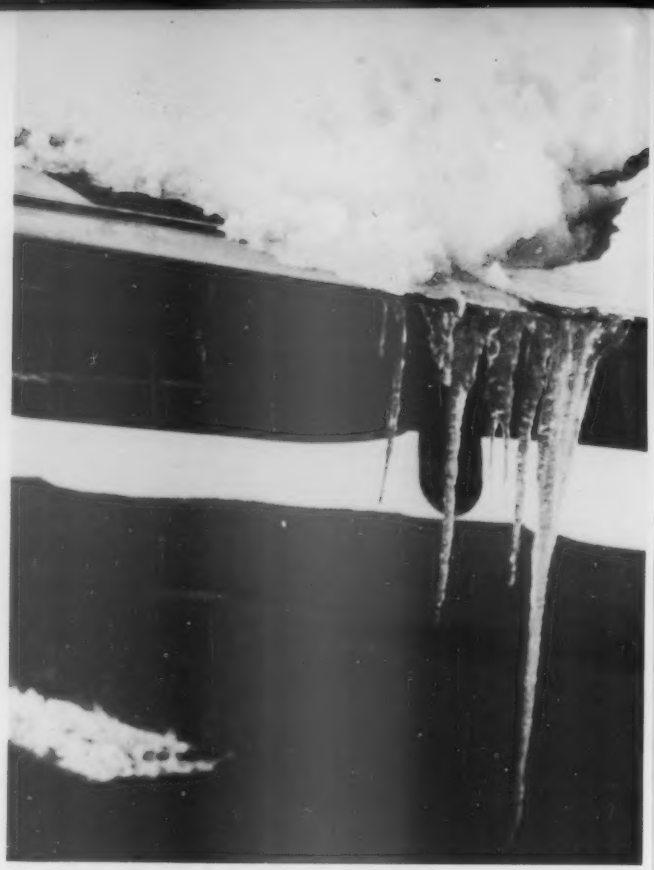
$$E.P.R. = \frac{\text{turbine exit pressure}}{\text{compressor inlet pressure}}$$

This important ratio, whether called E.P.R. or known by another name depending on the particular engine or aircraft type, is an indication of the amount of thrust being produced. Some naval aircraft utilize E.P.R. when setting their required takeoff thrust.

The same icing parameters can vary considerably in effect depending on aircraft type and operation. Consequently, what may be reported as light icing for one type could turn out to be moderate to severe for another. It is important for each of us to evaluate such parameters as airfoil shape, airspeed and altitude capability, available deicing/anti-icing equipment, icing conditions, etc. Only then can we properly determine the degree of hazard for each of our aircraft types.

WARNING

Under no circumstances shall flights be planned through forecast or known severe icing conditions.



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AIRCRAFT GROUND DEICING

When it is necessary to remove ice, snow or frost prior to flight, a solution of ethylene glycol and water should be applied to all aerodynamic surfaces. During conditions when ice or snow is continually accumulating during ground operations, the takeoff should be made within 30 minutes of application. A final physical check of the surfaces should be made just before takeoff to ensure surfaces are still free of ice.

WARNING

Deicing fluids do not protect against reicing that can occur from falling precipitation.

Dry snow, which can melt from exhaust from nearby aircraft, can refreeze and produce very irregular, disproportionate and dangerous buildups.

Note

Probes or devices installed to sense compressor inlet pressure can provide very misleading and erroneous readings of E.P.R. when restricted or covered by inlet icing.

WARNING

It is extremely important to reference engine rpm to ensure proper engine operation and thrust output when applying takeoff power. Emphasis is being placed on the absolute requirement to crosscheck all engine instruments.

When visible moisture is present and the outside air temperature (OAT) or ram air temperature (RAT) is 6° C/42° F or below, utilize engine anti-icing DURING ALL GROUND AND FLIGHT OPERATIONS.

TAXIING

Taxiing on ice and snow is hazardous at best. Speed should be kept to a minimum and extreme caution exercised. Increase distances between aircraft to ensure safe stopping distances and eliminate any melted snow that could result from jet exhaust. Use minimum power and avoid sharp turns. Stop gradually to avoid locking of tires and subsequent skidding.

Note

Windy conditions may complicate the aircraft's ability to maintain directional control on icy surfaces and cause weathervaning.

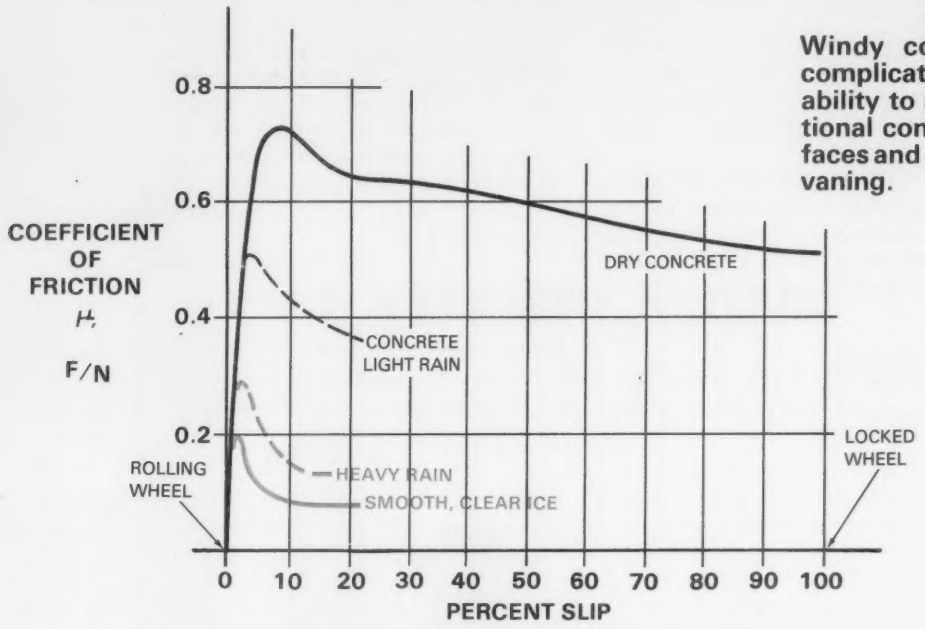

Figure (2) illustrates the coefficient of friction for an aircraft tire under various runway surface conditions. The degradation in braking ability for other than a dry runway can present a serious problem.

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TAKEOFF IN SNOW, SLUSH OR STANDING WATER

Prior to commencing a takeoff in snow, slush or standing water, consideration must be given to the resultant extended ground roll and the possibility of damage due to spraying contaminants. When the runway is contaminated by water, slush or wet snow in excess of one-half inch, the takeoff should not be commenced. At takeoff speeds, the viscosity and resistance of the contaminants increase dramatically. The resultant wheel drag considerably increases the takeoff roll.

Dry snow (snow that cannot readily be made into a snowball) also penalizes takeoff performance. Ordinarily, two inches of dry snow approximate the reduction in performance equivalent to one-quarter inch of slush or water. Similarly, four inches of dry snow would equate to one-half inch of water or slush and the takeoff should not be commenced when depth exceeds this amount.

SLUSH DRAG is a term which refers to water or partially melted snow, whereby through its depth, water content and density, it retards the forward acceleration of an aircraft by the resultant drag built up between the contaminants and the aircraft's tires. Under adverse enough conditions, the retarding force could actually prevent acceleration to rotation speed.

Continued

The retardation force of slush drag is proportional to fluid depth, its density and the square of the forward ground speed velocity. This is true up to the onset of dynamic hydroplaning.

Two inches of slush or water on a runway can produce enough resultant drag to overpower engine thrust and reduce aircraft acceleration rate to zero. This means that most jet aircraft would be unable to reach rotation speed (V_r) regardless of runway length.

By now it should be evident that slush, standing water, wet snow and dry snow slow the acceleration during the takeoff roll. This retardation becomes more noticeable as velocity increases. Oftentimes the ability to successfully abort the takeoff when well down the runway becomes very questionable.

TAKEOFF

WARNING

Ice, snow and frost must be removed before flight is attempted, as takeoff distances and climbout performance can be seriously affected. The roughness and distribution of the ice and snow could vary stall speeds and characteristics to a dangerous degree.

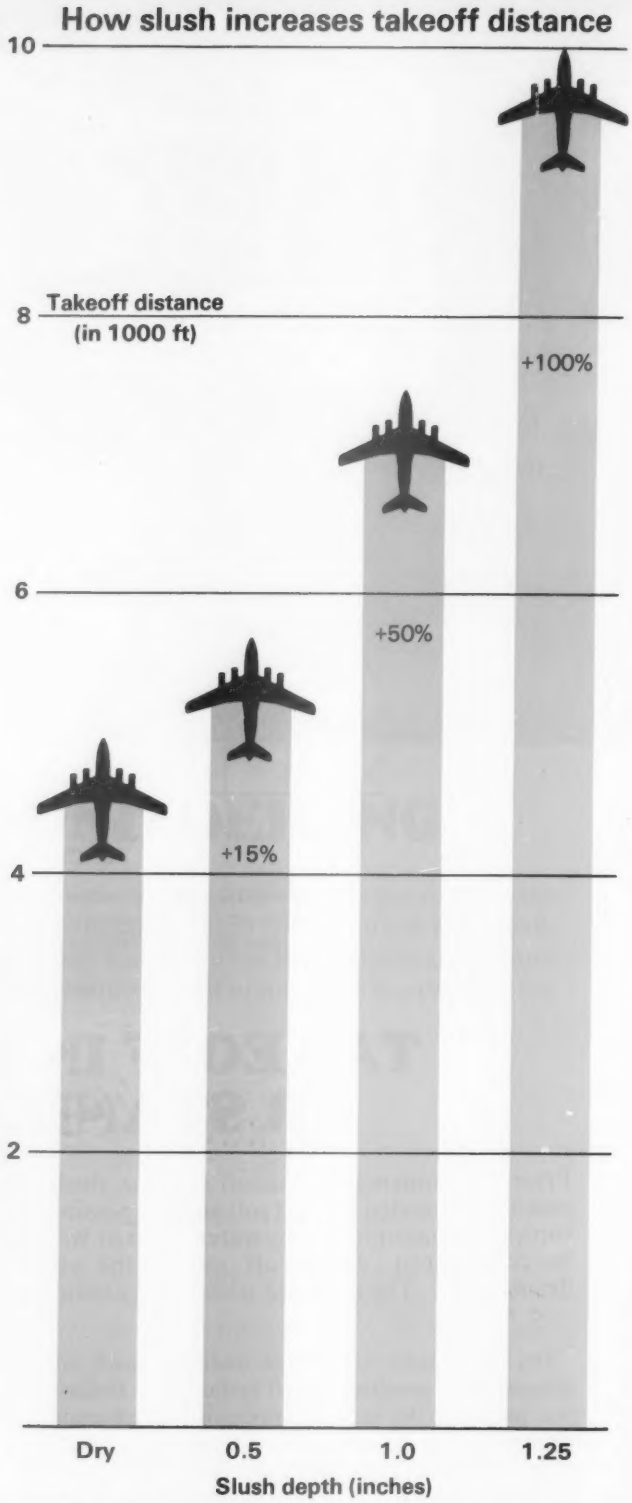


Figure (3) illustrates the increases in takeoff roll versus slush depth.

CLIMB, CRUISE, DESCENT AND LANDING

Ice collected during climb will reduce rate of climb and range.

If excessive ice formation remains after the use of airfoil deicing/anti-icing, level-off and increase speed to maximum allowable in an attempt to rid the surfaces of detrimental buildups. This high-speed dash should be accomplished at as low an altitude as possible to obtain the greatest effects from aerodynamic forces and heating. Flexing the wings slightly by applying small G-forces may aid this technique.

Utilize airfoil/engine anti-icing/deicing as appropriate. The preferred method is to turn these systems on PRIOR to anticipated icing conditions.

WARNING

Heavy ice accumulation greatly increases the stalling speed; therefore, airspeed should be increased during low altitude flight, approach and landing under such conditions.

HYDROPLANING

The presence of winter contaminants on a runway surface disrupts the contact between the tire footprint and the pavement. This interferes with the development of the frictional or tractional forces required for directional control and effective braking.

DYNAMIC HYDROPLANING occurs when the standing fluid is not displaced from under the tire at a fast enough rate to allow the tire to make contact over its entire footprint area. This type of hydroplaning may be either partial (a portion of the tire is still in contact with the pavement) or total (the tire is completely detached from the surface). During this type of hydroplaning, the aircraft is either partially or totally supported by the fluid pressure between the tire and the pavement.

CAUTION

Hydroplaning can result in the complete loss of tire friction, steering and braking.

During total dynamic hydroplaning, wheel rotation can stop completely. Research has determined that minimum total hydroplaning speed in knots to be equal to nine times the square root of the tire pressure:

$$V = 9\sqrt{\text{tire pressure}}$$

where V is the minimum total dynamic hydroplaning speed in knots and the tire pressure is in psi.

This equation holds true for a rotating tire as it travels from a dry to a flooded runway section. Later investigations indicated that when an aircraft touches down on a flooded surface, the hydroplaning speed for a nonrotating tire was slower than the original NASA equation for a rolling tire. Consequently, the derived equation for a nonrotating tire is:

$$V = 7.7\sqrt{\text{tire pressure.}}$$

Both equations serve as an excellent approximation of the minimum ground velocity for an aircraft to hydroplane. If a runway surface is rough, grooved or textured, and the tires have good tread depth, then the fluid depth must exceed both the tread and runway groove depth for hydroplaning to occur.

During slow speeds, the aircraft tire mass is sufficient to displace the fluid beneath it. It is primarily at higher speeds where the fluid cannot escape, that the tire is lifted off the surface and thereby supported by a thin layer of fluid that hydroplaning occurs. Refer to Figure (3) for illustration.

VISCOUS HYDROPLANING is a technical term used to describe the normal slipperiness or lubricating effect that occurs on a wet surface. This type of hydroplaning can occur at speeds well below that required for total dynamic hydroplaning.

REVERTED RUBBER HYDROPLANING can occur when a locked tire skids across a slippery wet or icy surface. The result is the generation of some very high temperatures (up to 600° F/315° C) due to friction. Steam is produced which serves as a lifting medium on which the tire rides above the pavement. The steam heat reverts the rubber back to its black, gummy, uncured state. Continued

Some recommended techniques for landing are presented when hydroplaning is anticipated:

- Land at the slowest possible approach and touchdown speed to decrease the time for hydroplaning.
- Make a firm touchdown.
- Employ all available means to safely and expeditiously decelerate the aircraft (spoilers, anti-skid braking, thrust reversers, field arrestment, etc.).
- When anti-skid is inoperative or not available, judiciously apply brakes. Exercise caution to avoid locking tires that could result in a blowout as the aircraft crosses over a dry runway section.

N.T.S.B. SYNOPSIS

Some of the National Transportation Safety Board's recommendations and statements made in January 1982 are summarized below. Their applicability is valid for both civil and military aviation.

Flight crews should become familiar with the potential hazards associated with engine inlet probe icing. Furthermore, all engine instruments should be cross-checked during the application of takeoff power.

All flight personnel should be aware of the inability of deicing fluids to protect against reicing resulting from precipitation following deicing.

Flight crews should become aware of all aspects of cold weather operations when they are so engaged, with emphasis on aircraft performance when a runway is contaminated with snow or slush for takeoff.

Flight crews should be required to visually inspect wing surfaces before takeoff, if snow or freezing precipitation is in progress.

Ensure compliance with FAR 121.629 (b) which PROHIBITS takeoff if frost, snow or ice is adhering to the wings or control surfaces.

A runway contaminated with snow, slush or water can severely decrease takeoff performance by preventing the aircraft's acceleration to rotation speed due to the increased resistance of the contaminants against the tires.

Aerodynamic lift is degraded by contaminated airfoils.

Engine and airfoil anti-ice should be utilized prior to and during takeoff.

WARNING

In cold weather, make sure all instruments have warmed up sufficiently to ensure normal operation.

Exposure to cold, slush and ice accumulation can make aircraft systems react in unusual ways. Always cross-reference all instrumentation and systems.

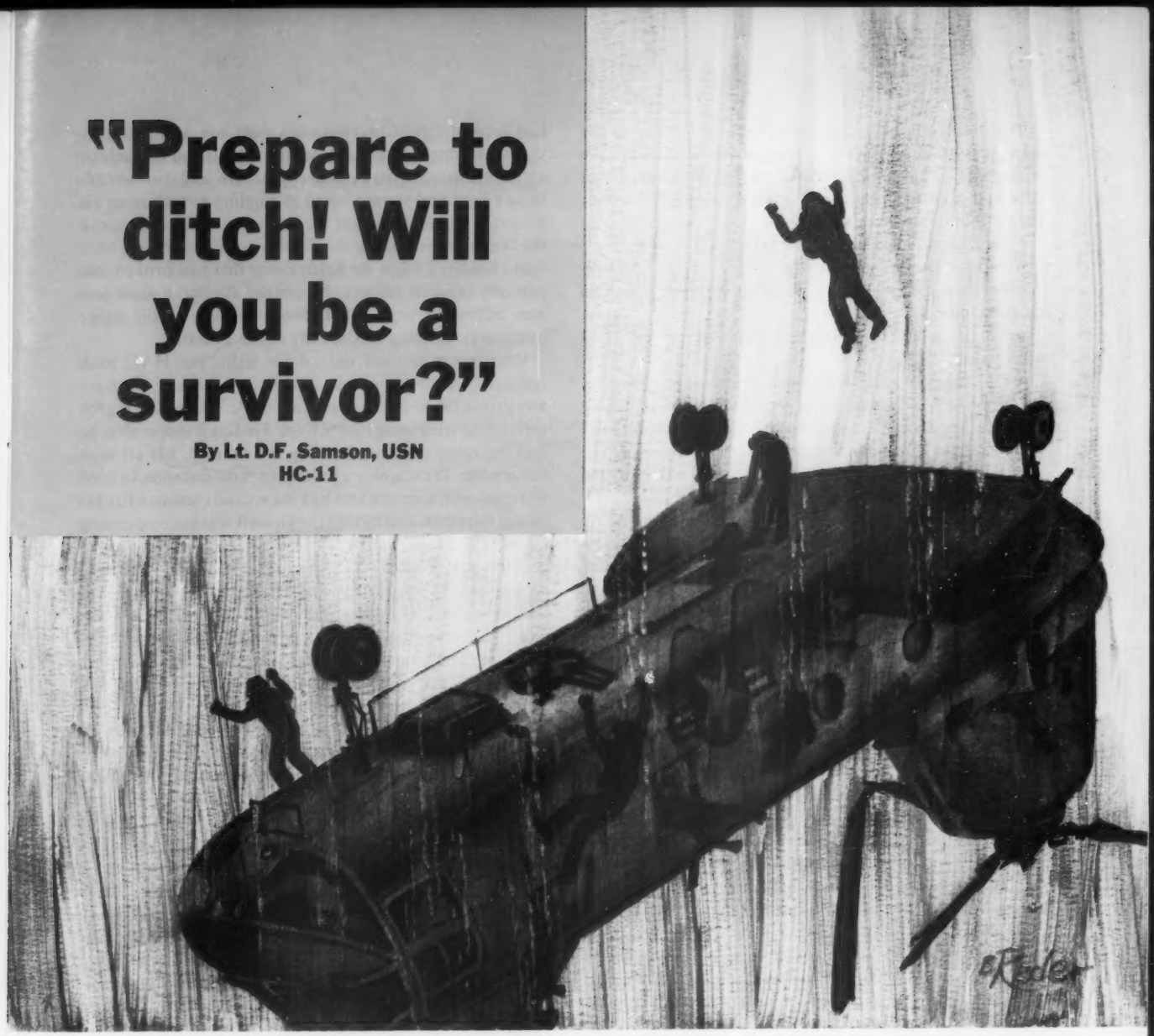
Understanding the basic fundamentals of cold weather operations is absolutely essential to all-weather flight safety. These thoughts will hopefully contribute to the safe and effective employment of naval aircraft in winter operations worldwide. ◄

ONE FINAL THOUGHT

The pilot in command is directly responsible for and is the FINAL AUTHORITY as to the operation of that aircraft.

"Prepare to ditch! Will you be a survivor?"

By Lt. D.F. Samson, USN
HC-11



What if, tomorrow, you become that proverbial "other guy" and are faced with an actual ditching at sea? Will you be ready?

RECENTLY an H-46 with eight people aboard (four crewmembers and four passengers) went down in 57°F water. This article will attempt to recreate the reactions and experiences of the crew and passengers during this mishap.

The H-46 has a notorious reputation for rolling upon water impact when not under power. This time was no different, but contrary to the odds, all eight people egressed the aircraft and were picked up by helo within 30 minutes. This forced landing ended successfully primarily because the crew was prepared. The flight crew conducted a standard NATOPS preflight brief which included procedures for ditching. The passengers had received a brief from their ship regarding helicopter operations, then another brief on emergency procedures from the aircrew once aboard the aircraft.

Continued

When ditching became imminent, the pilot alerted the crew, giving them ample time to prepare the aircraft and the passengers. The aircrewmen rebriefed each passenger a final time and pointed out specific emergency escape hatches. Preparation of the aircraft included:

- Securing all loose gear in the cabin.
- Verifying watertight integrity.
- Stowing troop seats to allow unimpeded access to escape windows.
- Placing a raft by the main cabin door for rapid deployment.
- Punching out all three emergency escape windows.

Immediately after impact, water surged into the helicopter through the starboard chin bubble (broken on impact) and through the rescue hatch which had been forced open. The aircraft immediately rolled to the right, and water entered through the starboard escape windows.

Each person aboard had planned his egress route prior to the actual ditching. The crewmembers were each able to use their planned routes; however, due to the roll of the aircraft, the passengers were forced to select alternate routes.

The pilot and copilot each used his own jettisonable cockpit door to escape. The HAC, who occupied the left seat, egressed with no difficulty. The copilot, who found himself underwater, had slightly more difficulty. After egressing, he found himself being pushed further below the surface by the nose of the aircraft. After several unsuccessful attempts to kick away from the sinking aircraft, he concentrated on one large kick to free himself. Once clear of the fuselage, he oriented himself, swam to the surface and inflated his LPA.

The first crewman, who sat next to the main cabin entrance, also exited the aircraft from underwater. As the helicopter rolled, he unbuckled and attempted to exit through the main cabin door, but was immediately pushed back by inrushing water. Maintaining a firm hold on his reference point, he was able to swim out of the cabin between five and 10 feet below the surface. Unable to free himself as the helicopter rolled and sank on top of him, he turned to face the fuselage, crawled up the side until he was free and swam to the surface.

Seated next to the rescue hatch on the port side was the second crewman. At water impact, he watched the rescue hatch break free and water rush into the cabin. Watching the rotors stop as the blades struck the water, he then unbuckled and began to egress through the port window. The rolling motion, however, caused him to fall back as he tried to exit. Holding on to his reference, he was able to pull himself up and out of the aircraft. He stood on the inverted fuselage for a few moments while the passengers egressed, before performing a running dive to clear the helo.

Although each of the four passengers was forced to resort to a secondary egress route, only one had difficulty exiting the aircraft. The first three to leave followed the second crewman. The fourth, however, was struck shortly after impact by either inrushing water or the rescue hatch which had broken free. Cut above his right eye and probably slightly stunned, he unbuckled his seatbelt and headed for an escape hatch. Totally underwater now and disoriented, he saw light and swam toward it. Finding himself in an air pocket in the aft section of the aircraft, he made his way to the "hellhole" rescue hatch. His efforts to escape were once again hindered when the hatch cover that had broken free partially blocked his way. He pushed the hatch aside and was helped through the hellhole by one of the other passengers standing on the belly of the aircraft.

Once everyone was out of the helo, the HAC took command of the situation, instructing everyone to move away from the aircraft and join in a circle. After checking for injuries, he tried using his PRC-90. Finding it inoperable, he had the other crewmembers try their radios, but all were inoperable. Then, seeing a helicopter in the distance, he tried to signal with a smoke and had the second crewman fire his pencil flare gun. Seeing that the aircraft was not responding to the signals, he waited until the aircraft was heading in their direction and then actuated a second smoke. This time the crew of the rescue helo saw the signals and was overhead within minutes. As the rescue swimmer approached, the pilot instructed him to pick up the injured passenger first, then the remaining passengers, the aircrewman, the copilot and himself last. Shortly thereafter all survivors were safe aboard the CV receiving medical attention.

It is apparent that this flight crew and passengers were prepared to handle the predicament in which they found themselves. There are some lessons to be learned for anyone — passenger or crew — ever boarding an aircraft:

Don't panic. Prebrief in your mind — think through as many different situations as possible. Remember, you're not a survivor until safe on deck at a ship or station.

Rebrief before you fly. Talk about what you plan to do should a ditching situation arise.

Know the equipment available to you and carry what you need (i.e., exposure suits if necessary). Know where each piece of gear is located, what it can do for you and probably most importantly, if it is operable.

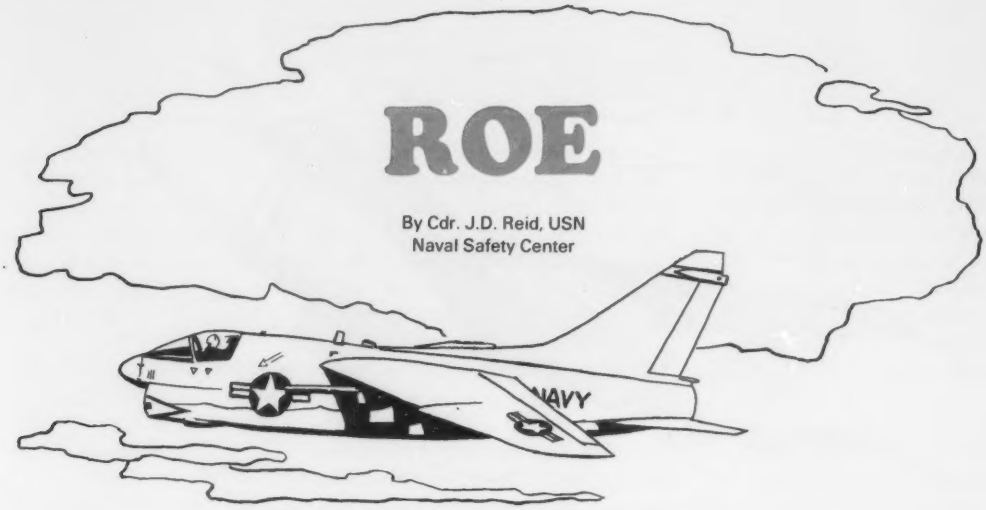
Be flexible. Don't get locked in to one avenue. Be prepared to change your plans if necessary.

A little realistic training doesn't hurt. The second crewman had six rides in the helo dunker before he finally got it right — *he got it right the first time when it really counted.* The copilot stated that his scuba diving experience helped him to calmly think through his underwater situation.

Have the will to survive. These survivors were fortunate. You might be in the water only 30 minutes, but then again you might be there a lot longer. Never give up your will to live.

It is unfortunate when we lose an aircraft at sea, but when a life is lost it is tragic, especially if passengers and crew survive initial impact, only to become trapped inside a sinking coffin or succumb to exposure in icy cold waters. The ending was a happy one for these eight folks. How about you? Will you be a survivor? ◄

The rules of engagement discussed in this article are typical of those commonly in use, but they may vary among different activities. The Naval Safety Center is not endorsing any particular set of rules here. — Ed.



EVERYBODY briefs it but does everybody understand it? The Rules of Engagement (ROE) were developed for safety-of-flight and to ensure that everyone is playing by the same rules. How many times at the conclusion of a brief is the ROE glossed over in a casual manner indicative of the lead's confidence in his, and his flight's, understanding of these rules. Let's get on with the flight! But wait, there may be a "gotcha" in this standard ROE. Of course, everybody knows what the 500-foot bubble is, 15,000 feet between cloud decks, nose high goes high, etc., but does everybody know the difference between the soft deck and hard deck? Frequently, this is referred to as a 10,000-foot soft deck and a 5,000-foot hard deck (at sea level, adjusted accordingly for high terrain/clouds). All too frequently, however, the players don't really understand what can transpire or should transpire in this 5,000 feet of airspace.

Most define this space as an area where you must keep your energy up and avoid high angle-of-attack (AOA) maneuvering. Occasionally, you may even see an airspeed, such as 300 knots, mentioned as a minimum airspeed below 10,000 feet. One must also remember that what's a high-energy state for one aircraft may not be the same for another aircraft, i.e., what is your loadout/configuration. That's why your aircraft's performance charts should be reviewed. Aircraft whose flying qualities degrade with external stores should enter the 5,000-foot arena manned by aircrews armed with complete knowledge of operational configuration effects on their aircraft's departure characteristics and adjust their aggressiveness accordingly.

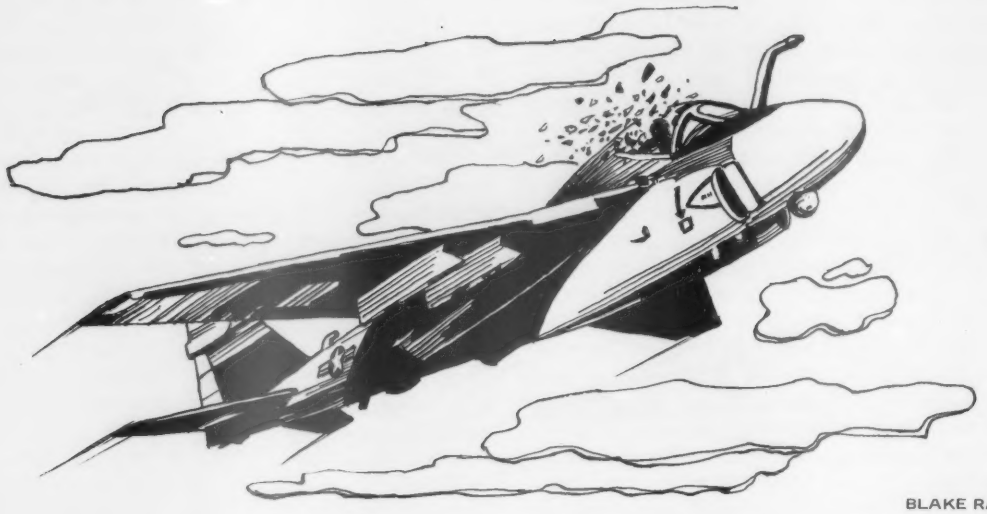
Now, what is high AOA maneuvering? Most would say any angle-of-attack above optimum. Certainly in this arena, if you find yourself cross-controlling the aircraft to position the nose, then your AOA is above optimum.

So, for what is the 5,000 feet of airspace used? Certainly not for high AOA, low energy fighting! But, as a cushion at the bottom during a maneuver, building energy to get back into the fight, controlled defensive maneuvers (not last ditch maneuvers) or for a bug-out. Sounds pretty tame, I agree, but there just isn't enough altitude to always recover from a departure nor are there enough assets available to experiment in this area. When was the last time your squadron actually briefed the ROE and discussed energy states and AOA for maneuvering below 10,000 feet?

Permission to fly DACM (defensive air combat maneuvering) below 10,000 feet shouldn't be rubber-stamped on anybody. Successful completion of a RAG ACM syllabus, FFARP (Fleet Fighter ACM Readiness Program), out-of-control lectures and a spin hop are blocks upon which to build proficiency and confidence, but they don't qualify a pilot for his "5,000-Foot Letter." Performance, proven good judgment and headwork are the other portions of the equation.

With the high cost of aircraft today, the temptation to "just pull those few degrees more for the shot" has to be tempered with the judgment and headwork that allowed you in the 5,000-foot arena to begin with.

Understand and brief the ROE! Don't let that sudden lapse in judgment spoil your day. ◄



BLAKE RADER

If You Need Proof, Here It Is. The crew of a CV based A-6E had just completed five ordnance runs on a training target and was preparing to return to base. Climbing through 19,000 feet at 250 KIAS, the glass on the right side of the canopy imploded. Because of the uncertainty of the injuries to the B/N and his inability to communicate on ICS or UHF radios, the pilot elected to divert to a nearby NAS. His wingman provided the communication link and obtained clearances for the aircraft to land at the NAS.

Following landing, the B/N was transported to a nearby Navy Regional Medical Center (NRMC) for examination and treatment of his injuries which consisted of superficial cuts and bruises to his forehead (his helmet visor had been down at the time the glass imploded). The helmet visor, visor guard and helmet shell were inspected and found to be cracked and split.

We won't go into the details surrounding the failure of the canopy glass here. The message we want to get across in this article is best described in the comments of the squadron CO regarding this incident.

"The potential for aircrew injury and incapacitation in this incident was significant. The fact that cockpit discipline was maintained is only one indication of the professionalism involved in the handling of this hazardous situation. The favorable outcome of episodes such as this one speaks highly of the protection provided by flight gear when it is properly used."

Once again we have documented evidence that keeping the helmet visor down during flight pays off. We hope that you nonbelievers and fence-sitters will have a change of heart after reading the above.

Hanging in There. After completing a loop with the T-2C level at 14,500 feet and 340 KIAS, the nose of the aircraft pitched down violently sending the student naval aviator (SNA) and seat pan toward the top of the canopy. Attempts to reach the stick to neutralize the flight controls were unsuccessful due to the position of the SNA in the cockpit. He was, however, able to reach both power control levers which he reduced to FLIGHT IDLE and then extended the speedbrakes. This action brought the nose up and the SNA was able to reach the stick and neutralize the flight controls. At this point, the airspeed was 250 KIAS and altitude 8,000 feet.

With aircraft control regained, the SNA contacted the base and was directed to slow flight the T-2 to check controllability. After climbing to 12,500 feet, the SNA checked the flight controls and found them okay in the landing configuration. The SNA then flew the aircraft back to his home field where he made an uneventful full stop landing. A postflight maintenance inspection revealed that the elevator boost package had failed, leading to the oscillations. Had this occurred at a low altitude, the results more than likely would have been catastrophic.

In this incident, the SNA was properly strapped in and observed that his aircraft was above the mandatory out-of-control ejection altitude of 7,000 feet. This is an exam-

AIR BREAKS

ple of being totally prepared for the unexpected. This emergency is not common in the community and cannot be simulated in the 2F101 trainer. By being prepared, this SNA undoubtedly saved his command a valuable training asset.

HU Isn't UH. Here's one for all of you air traffic controllers.

A U.S. Coast Guard HU-25A was airborne about 60 miles south of NAS Gulf. The crew had just canceled its IFR flight plan and was proceeding to an offshore point to conduct a practice search. Descending through 5,000 feet, the pilot noted left engine oil pressure at 30 psi. He immediately added power but noted no change in the oil pressure reading. The pilot then secured the left engine.

At this point, the decision was made to divert to NAS Gulf. Southwest Center was then contacted and an emergency was declared. All ATC handoffs were accomplished without difficulty until NAS Gulf took over. Initial vectors were to runway 4, then were changed to runway 32 and finally runway 22. All vectors overshot the runways and the HU-25 ultimately ended up in a severe weather area. On the final approach, the aircraft encountered VMC 90 degrees to the runway centerline and over the approach end. With the field in sight, the pilot elected to execute a visual approach and an uneventful landing followed.

Those of you who figure NAS Gulf air controllers mistook the HU-25 for a helicopter; you're right. They read HU-25A in the aircraft type block but thought UH-25A in their minds and thus they believed they were vectoring a helo. Even the higher speed of the Falcon failed to register with them.

While the Coast Guard and NAS Gulf are taking appropriate action to prevent a similar occurrence, we're passing this information on so that the same thing won't happen to you. The HU-25A is a relatively new addition to the Coast Guard and you may not have worked one yet. Coast Guard pilots flying the HU-25A have been advised that if there is any doubt in their minds, they should identify their aircraft type to the controllers. Nevertheless, it happened once and can happen again if some of our air traffic controllers are not made aware of this incident. You've got it, ATC officers!

Things Got Out of Control. The hazard we're about to discuss could occur at any airfield with catastrophic results. All airfield operators should read and heed the message presented.

An EA-3B was cleared for a night takeoff on runway 28 to enter the FCLP pattern. Shortly thereafter, a convoy of three vehicles positioned at "Throat 5," called for clearance across the same runway. The tower controller directed the lead vehicle to "hold your position." The truck driver responded with "roger" and then proceeded across the runway. The pilot of the EA-3B saw the trucks after 1,000 feet of roll, 80 KIAS and aborted the takeoff. The closest point between the vehicles and the aircraft was 1,000 feet.

A review of the tower tapes indicated that at the time of the incident the tower operator was talking rapidly and unkeying his "mike" prior to finishing transmissions. He also turned away from the mike during the first portion of the transmission. What came over the air was a very muted "hold y'r" and then a stronger "posi -." The driver and passenger of the lead vehicle understood this to mean cleared to proceed.

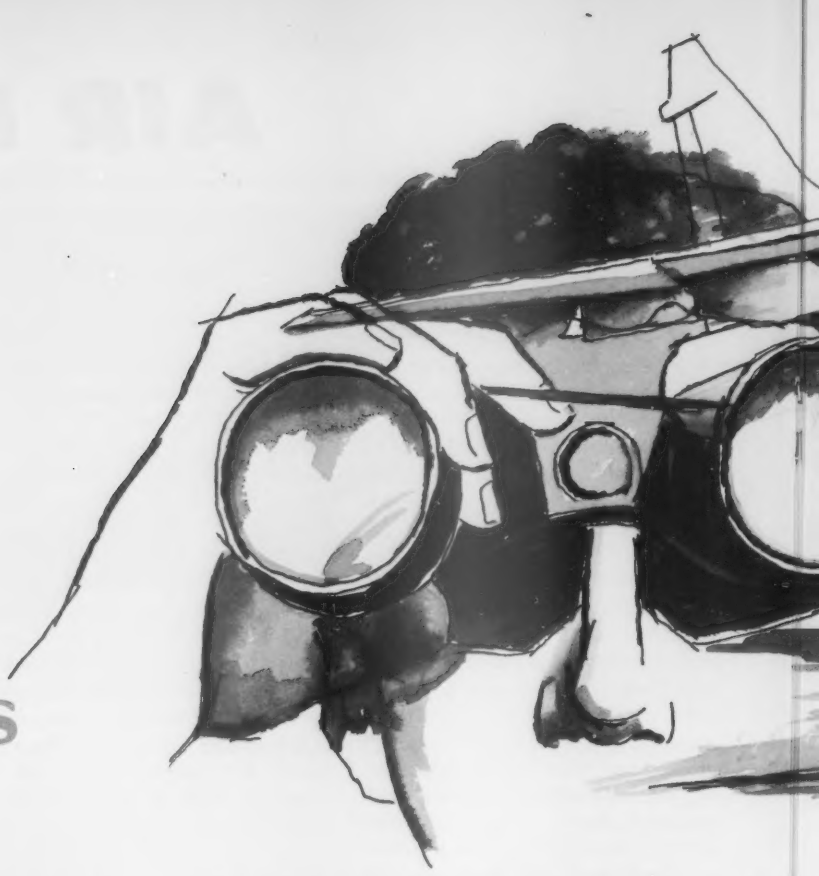
The controller was alone in the tower at the time of the incident and was working both the ground control and the tower position. The tower is normally manned by two controllers. But during this evolution, one of them had departed for a short time. The driver of the lead truck had looked down the runway prior to crossing but didn't see the EA-3B. Throat 5 is 2,400 feet from the approach end of runway 28. Since the EA-3 was to enter the FCLP pattern immediately after takeoff, only the aircraft's navigation lights were on, which made it difficult to distinguish it from among the runway lights.

Here was a disaster waiting to happen. The controller used poor radio technique and diction (he's been counseled) and the lead vehicle driver failed to ensure he was in fact cleared to cross the duty runway. The ATC division of this airfield now conducts a ramp safety presentation for all drivers who operate vehicles on the ramp and taxiway. All drivers are required to attend this training prior to getting a license to drive on any portion of the airfield.

Several opportunities to prevent this routine evolution from almost becoming a disaster were missed. Not because of procedural violation but because the individuals involved failed to pay attention to what they were doing.

A Perspective on Safety

Players Not Spectators



By Cdr. T.J. Hayes

HOW many times have we found ourselves dreaming of catching the pass which wins the game, winning the race or being No. 1 in some competition? If honesty prevails, each one of us would admit to such heroic visions. Why not? Quite often victory begins with the challenge being envisioned at the outset as successfully completed. Dreams, mental images, even visions, often motivate action but alone they rarely accomplish the goal.

To win one must play. We must get into the game with the desire to win. We must participate; *this is action!* To dream or imagine is only a part of the whole. Spectators don't win; they just sit. Likewise, in naval aviation safety, it is the player who not only makes things happen, but wins. The player knows the goal is zero mishaps, and a safe environment is essential. He also knows mishaps can occur but "steels" himself to ensure "mishaps don't happen on my watch."

The spectator dreams great dreams, watches and admires the great players but never gets out of the stands and into the game. Regretfully, there are some spectators who really don't care about the game. Regardless, everyone involved in naval aviation from civilian support personnel, maintenance personnel and aircrews to every pilot in the cockpit, must get in the game and play to win. Zero mishaps and a safe environment is both a workable theme and an achievable goal. It is a must, not a choice or a nice-to-have motto, if we are to achieve and sustain a readiness level which will enable prompt and sustained combat operations at sea.

What does it take to get everyone in the game and keep them alert and productive? The absolute first thing to be done by each of us, player or spectator, is to accept the goal — zero mishaps. Zero mishaps are possible only when each one of us becomes dedicated to preserving our resources. To preserve material and personnel resources is the enabling step to peak readiness. The daily resources, individual and organizational, which are at hand to preserve our operational resources are: time, knowledge and standard operating procedures. The first action must be to organize, plan and use time properly, gain the knowledge to act correctly and then apply standard, practiced working procedures to ensure efficient and safe outcomes. Combat operations and emergency situations should be the only time one deviates from standard accepted procedures. *The second action* to take is to answer these questions. If a player, how do I improve on and sustain my winning safety attitude? If a spectator, how do I get out of the stands and onto the playing field where I'm needed and everything is happening?

The player knows, believes and executes the safety game plan; *safety attitude and efficient resource application plus conservation = readiness.*

The player must continue to accomplish the following:
— Take time to think and act safely and demand the

same of others. Sell safety through personal example.
— Know in detail how to execute each evolution.
— Demand that everyone complete each task correctly every time. Hold everyone accountable.
— Expect successful outcomes.
— Exercise mental toughness and leadership to keep the total environment safe.

The spectator is ignorant of the safety game plan and is fooling himself in believing that his participation is not desired, required or will achieve little.

The spectator must get into the game by:
— Waking up to the reality that aviation organizational safety, like life, requires participation.
— Imagining himself a player and getting involved.
— Talking to the player about what can be done to help. Find a job and do it!
— Getting on with the preceding five player actions.

In a typical organization everyone can and must become an effective player in resource conservation, safety and readiness. Top leadership must set the policy that peak readiness is No. 1 only if achieved and sustained in a zero mishap environment; this puts the top priority in focus. Administration can provide a flawless customer service environment which breeds confidence that the individual's professional affairs are in order. This helps reduce anxiety and directly affects attitude and morale. Maintenance can become tenaciously dedicated in providing quality aircraft which make every event. This instills confidence and trust in the aircraft, the department and becomes a key factor in overall command effectiveness and readiness. Operations can schedule perfectly, taking into account all factors in each event. This supports flying for readiness and qualifications and counters the attitude that flying is to bore holes. Safety can remind us to think and act safely at every turn. This keeps safety constantly before us. The training department can ensure we have the knowledge and training experiences to complete each task perfectly every time. This builds individual and team confidence.

Finally, all organizational resources are limited and must be wisely employed. Concurrently, there are multiple claimants competing for these finite resources. It is up to each of us to preserve our resources until the equitable share of dollars comes to sustain and/or replace material and personnel attritions. Therefore, time is limited — plan it and use it wisely; it is not recyclable. People are our most valuable resource — take care of each other. Machines are limited — maintain and operate them correctly every time. Make them last. Zero mishaps can be a reality provided the experienced players keep at it, and the spectators stop watching, dreaming or ignoring the realities. Get into the safety game and become players. *Are you a player or spectator? Players, not spectators make things happen!* ◄

Better Liaison Needed

18 Recently, we conducted a FOD walkdown, with participation by all units aboard our air station. Most assuredly, it was an excellent idea in two respects: to clean up the airfield and to get the war on FOD firmly implanted in everyone's mind. For this evolution, the airfield was NOTAMed closed, and all hands were briefed beforehand on the quarterdeck. The FOD walkdown was conducted successfully and without incident until near the scheduled time for the airfield's return to normal ops.

At the scheduled time of the airfield's reopening, one FOD walkdown unit was at the north end of the airfield approaching the east-west dual runways. They were continuing their walkdown en route to their hangar on the southeast corner. Upon crossing the outboard dual runway, personnel still conducting the FOD walkdown were directed by air station personnel to *hold between the duals for landing traffic.* While this unit was holding in place, one tactical jet and two propeller-driven aircraft were allowed to land, using both dual runways. Of immediate concern to most members of the unit were the consequences of a blown mainmount or brake failure, either of which could have led to a "Navy Aircraft Departs Runway — Mass Injuries and Fatalities" headline. Those aircraft could have remained airborne until the airfield was indeed ready to accept landing traffic. It would have taken only an extra two to five minutes to have that large group of personnel clear of the duty runways.

Lessons Learned: (1) NAS safety should have effected better liaison with airfield ops; (2) don't rely on someone else for your safety responsibilities.

Strandedmouse

Switching Seats While Airborne

A KC130R departed the local tanking track and returned to homeplate, where the aircraft commander shot a low approach and a touch-and-go from the left seat. The copilot needed three touch-and-go's, and the plan was to switch seats on a 1,500 feet downwind with the autopilot engaged. The aircraft commander instructed the flight engineer to sit behind the controls in the right seat while the exchange took place on the left. Both the copilot and the flight engineer stated that they did not feel comfortable with this arrangement. After some discussion, the aircraft commander decided to make the switch as planned, but agreed to climb to a higher altitude first.

Shouldn't one qualified pilot be in reach of the controls at all times? Couldn't a full stop landing be made for the switch? Couldn't the copilot fly his touch-and-go's from the right seat? I don't feel that the actions taken here were safe, or that they were justified by the requirements of pilot training.

Crewsafetymouse

The seat switch method you describe is not prohibited by NATOPS and is commonly used in the prop community. It is not even a requirement to have the flight engineer sit in the right seat, although it would seem to be good headwork whenever one is available. In any event, the full stop option is obviously the safer choice. As

ANYMOUSE

to the possibility of right seat landings, this would depend on individual pilot training requirements.

There have been several cases of C-130s performing a "hard-over" maneuver, without warning, caused by the autopilot. Autopilots in general should not be trusted implicitly. It is the responsibility of the pilot in command to determine if the aircraft could be safely recovered if the autopilot generated a severe control input with both pilots unstrapped and out of reach of the controls. — Ed.

Boarding Ladder Needed

I was working during the night shift in the avionics division work center. We had corrosion work to do on a P-3 requiring quite a few materials, i.e. spray cans, rags, flashlights, acid brushes, tape, etc.

We had to climb up a B-5 stand which was being used as a boarding ladder. To climb a B-5 stand is a straight-up climb with small steps. I was carrying these materials up the ladder and dropped one of my flashlights. The flashlight broke in half from the impact.

The B-5 workstand is a very poor substitute for the original boarding ladder. The incline is too steep to safely handle parts while climbing. Someone is going to fall. This is causing a hazard to personnel and damage to parts.

The original ladder was broken and was turned in to supply, causing a shortage. If the original boarding ladder is not available, a suitable replacement must be provided to allow safe entry into the aircraft.

Toosteepforthismouse

Button, Button, Who Has The Button?

During one of our squadron's personnel inspections, it was noted that several personnel had "buttons" missing from the left rear pocket of their dungaree trousers. This is a new item added to the trousers to prevent loose items from escaping the pocket and becoming a piece of FOD. Due to the poor quality of thread being used, the button becomes detached, unknowingly to the user. Not knowing when and where it was lost has in fact created a FOD problem instead of eliminating one. My suggestion is to eliminate the button altogether, have the manufacturer use a more durable thread, use other means of securing the pocket or eliminate the rear pocket, thus eradicating any potential FOD

problems created by having articles in one's rear pocket.

This problem is under study. Dungaree owners are advised to have the stitching reinforced or remove the buttons before they become FOD. The letter entitled "Where Have all the Buttons Gone?" on page 23 addresses this also.

External Power Hazard

Aboard the USS LPH in the Western Pacific where the CH-53s fly free, this safetymouse has had a couple of back-to-back rude awakenings. Within hours of each other, two in-a-hurry mice applied deck edge power to a CH-53 without preflighting the cockpit or ensuring that everyone was clear of possible shock hazards. As luck would have it, one of our "electric mice" was elbow deep into a circuit breaker panel, troubleshooting a system that needed repairs, and "bingo" electrical power was applied. Every man onboard ship was lucky that night. We had six 53s sardined into the forward section of the hangar deck! If a fire had started, it would have been very hairy indeed!

As luck would again have it, our electric mouse emerged rather bent out of shape but otherwise unscathed. We now call him "lucky to-be-alive mouse!"

We thought we had the application of power to an aircraft down to a science, through our GSE licensing program. Sitting back at NAS Homeport, it never occurred to anyone that yellow gear does not use deck edge power. We now require that anyone who applies external power to an aircraft, deck edge or otherwise, be in possession of a GSE license for NC-8, NC-2 or MMG to ensure they have had aircraft type indoctrination.

You guessed it. The in-a-hurry mice were newly assigned and no one had told them they couldn't use deck edge power! Has this ever fallen through the cracks in your squadron?

Rudelyawakenedmouse

Poor Preflight

While preparing to launch on a T-39 postmaintenance checkflight, the crew conducted a thorough (?) preflight. All discrepancies noted were repaired and the aircraft manned. After completing all prestart checklists, the No. 2 engine was started, then the speed brake closed. Immediately, the pilot and NFO noticed an unusual noise and at the same time the plane captain signaled for the speed brake to be opened. The engine was secured. Exterior inspection revealed the speed brake downlock collars installed. The speed brake downlock foot was forced into the speed brake actuator attaching point, causing a two-inch crack in the speed brake skin. Lessons learned: (1) maintenance can forget; (2) plane captains don't catch everything on the turnaround/daily; (3) aircrews do not always see the obvious.

Blindmouse

Prescribing a Safety Hazard

By Lt. David M. Kennedy, VA-27 and
Lt. William R.C. Stewart III MC, MAG-29

The Naval Safety Center has concluded that clothing made of 100 percent polyester fabric . . . poses a serious burn hazard because the fabric melts and clings to the skin when exposed to temperatures in excess of 500° Fahrenheit.
CINCPACFLTNOTE 10120 27 DEC 79

Local flame testing of poromeric footwear indicates that this material will either melt, or melt and burn when in contact with a flame.
NAVSAFECEN Advisory 7-81

EACH year over two million Americans receive burns severe enough to prompt them to seek medical attention. Of these, 70,000 require treatment in a hospital. Burns are a major cause of injury and death in the young to middle-age population, and a significant cause of lost man-hours and productivity in the work force.

In aircraft mishaps, only 3 to 10 percent (depending on aircraft type) involve fire. However, these fiery mishaps account for a disproportionate *65 percent* of aircraft mishap deaths. Many of these deaths are preventable if proper precautions are employed to prevent or decrease the severity of the burns sustained in such mishaps.

The severity of a burn depends upon the intensity of the heat and the duration of exposure to the heat. First-degree burns affect only the superficial skin, similar to sunburn and are characterized by red, tender skin. Second-degree burns damage the deeper skin, causing blisters and more severe pain. Third-degree burns involve the tissues beneath the skin (including the nerves) and yield painless dead tissue which will not regenerate, causing permanent scarring and disfigurement. Although the heat of an accidental fire is difficult to control, decreasing the exposure to the heat through the use of proper clothing and safety equipment can significantly decrease the severity of burns sustained.

Dearly purchased experience has taught those of us in the Navy that different fabrics have extremely variable characteristics when exposed to fire. Unfortunately, some of these lessons are either ignored or not promulgated widely until after yet another tragedy causes an all too temporary interest in the subject. The following examples, while not all encompassing, are intended to stimulate thought about potential (preventable) hazards which may exist in your work spaces.

In the 1970's, the United States experienced a polyester revolution which included widespread use of a polyester fabric weave known as double knit. The fabrics were hailed as light in weight, inexpensive and easy to care for. The Navy leapt into the polyester program with both feet, authorizing almost every uniform to be manufactured from the material. As an example of this transition, enlisted jumper white uniforms, formerly all-cotton, were reissued in an all-synthetic material. Corfam poromeric shoes continued to be popular as an easy-to-care-for part of the uniform. It was possible and commonplace for a Navy man to be clothed from under- to outerwear entirely with synthetic materials.

A disturbing fact soon became clear about the polyester and poromeric materials — they melt when exposed to flame. Short of melting, the Naval Safety Center discovered that double knit materials have increased heat retention properties — enough to convert a first-degree scald into a second-degree burn, for example. Additionally, a disturbing set of events occurred which seemed to reflect doubt on the advisability of using polyester materials for naval uniforms. A lieutenant wearing double knit khakis was fatally burned when exposed to flash fire in a ship's fireroom. Safety Center experiments showed that corfam poromeric shoes burned and melted when subject to flame. Following a crash, an Army aviator wearing a NOMEX flight suit received fatal burns traceable to the melted nylon undershorts and undershirt he was wearing. His NOMEX flight suit was intact and his copilot, wearing NOMEX with cotton undergarments, was only slightly injured. In more recent experience, Royal Navy crewman wearing polyester coveralls suffered severely aggravated polyester slag burns during the Falkland Islands conflict during damage control operations.

We often say that our safety regulations are written in

blood, and in the case of synthetic materials, they have been. To the Navy's credit, changes were immediately enacted in the face of such irrefutable experience. One hundred percent polyester uniforms were prohibited from operating firerooms. The wearing of long-sleeve shirts was encouraged aboard ship. Only undershirts made of white cotton or cotton/polyester blend were authorized, with round-neck undershirts required with the jumper aboard ship and in areas where industrial fire hazards exist. Flame retardant clothing (long required of flight crews) became mandatory when engaged in hot work such as welding, when exposed to open flame during boiler light-off and when performing spark-producing work such as grinding. Finally, the following criterion for evaluation of uniform suitability was added to Navy Uniform Regulations in the late 1970's.

SAFETY — *The ability to protect, or at least not present, a hazard to personnel. (Uniform Regulations 1305.1.b)*

One curious aspect of these positive steps, however, is their very limited scope. They seem to be based on a belief that fires in general are confined to spark and flame-producing industrial work environments, and that fires onboard ship are limited to firerooms, boiler rooms at light-off, welding operations and grinding. *Our hard-earned corporate experience has shown, to the contrary, that fires can and do occur anywhere, in the home, in transit and at work.* Any space onboard ship must be considered as the potential location of a fire, and all have been at one time or another. We are obliged to examine the scope of the prohibition of 100 percent polyester uniforms by answering these questions: Of all burn deaths and injuries suffered by Navy personnel, how many have been confined to firerooms, boiler rooms and machine shops? How many have been confined to ships? Additionally, how can we justify the wearing of 100 percent polyester uniforms in a situation in which onboard ship when every man and woman onboard must be prepared to fight fires.

We can be justifiably proud of the Navy's stalwart stand in favor of shipboard construction materials which are safe — or at least not dangerous — when exposed to the inevitability of fire at sea. The methods take longer and the materials cost more, but we justify the effort in terms of personnel alive and ships afloat as a direct result. Recent fires in major hotels and on airliners are driving home this hard lesson to our civilian counterparts. An example of this is the controversy surrounding the fire aboard Canadair DC-9 Flight 727 in which 19 persons died as the result of fire. *Time* magazine of 3 June 83 stated in what has almost become the standard post-airline echo:

"In Washington, aviation officials debated once again whether more stringent regulations regarding fire-resistant materials inside jetliners should be imposed. The disaster was likely to put pressure on the FAA to formulate fire-prevention policy for airline cabins."

The irony of accidents is at work here. Not just that we could easily prevent the cause of any accident ("breaking a chain of event" is often heard), but that certain injuries could have been reduced or eliminated altogether by very simple precautions. In the case of 100 percent polyester uniforms, the irony is one more of commision than omission and for that reason is doubly ironic.

So, you may ask, why not let the problem be known and let the choice lie with the individual? Make the hazards known and leave the rest to personal judgment. The answer is simple: Certified Navy Twill. It's new, it's polyester and it's not optional. It is the new standard approved fabric for khaki and white working uniforms. In the face of all we have learned, the painful self-awareness of the dangers involved with certain synthetic materials and the positive steps the Navy has made to eliminate these hazards, we have taken a large step backward. In the Naval Safety Center's own words (Weekly Summary 17-83):

"The new Navy uniform material is called "Certified Navy Twill." Actually, it's 100 percent polyester despite the salty designation. More important, it melts well . . . ."

Prescribing a demonstrably hazardous material for use in demonstrably hazardous work environments in direct contradiction to stated Navy policy and documented experience may very well constitute the ultimate irony. At the minimum, we urgently need to reevaluate the use, and requirement for use, of polyester materials in any Navy uniform. As experienced calculated risk-takers, we learn to pick and choose the risks we take carefully. Let's eliminate this obvious and unnecessary one.

Continued

The following was received in response to this article:

From: Commander, Naval Military Personnel Command (NMPC-04)
To: Commander, Naval Safety Center

Subj: Certified Navy Twill uniforms

Ref: (a) LT Flynn ltr 71:JMF:nph of 28 September 1983

1. Reference (a) provided a proposed Approach article on fire hazards connected with subject uniforms and requested an official response. The following information should be used in the edition of Approach which prints the proposed article, because it contains some erroneous information and implication about fire hazards associated with Certified Navy Twill uniforms:

2. Certified Navy Twill (CNT) was approved by the Chief of Naval Operations for use as a dress, liberty, and ceremonial uniform. This fabric was selected, because it answered a number of requirements and additionally was a marked improvement over the old "double-knit" uniforms. Specifically, CNT is washable, virtually wrinkle-free, wears well, and keeps its sharp appearance over time. In addition, the material is available in sufficient quantities for Navy needs and is relatively inexpensive. The cotton-polyester blend uniform meets many of these requirements as well but does wrinkle and does not wear well over time.

3. As for safety, CNT was tested by the Navy research laboratory in Natick, Massachusetts. The results showed that CNT actually flames at a slightly higher temperature than the cotton-polyester blend currently used in working uniforms but does not draw heat away from the body as well as the cotton-polyester blend. For this reason and the aforementioned advantageous qualities, CNT was designated as the material of choice for Summer dress and ceremonial uniforms, while the cotton-polyester blend remains the *only* authorized material for working uniforms aboard ship except in fire or heat hazards areas, where Navy fire retardant uniforms designed specifically for wear in these areas are provided.

T.C. Fritz
By direction

An editorial note from the Commander, Naval Safety Center:

One hundred percent polyester clothing presents a hazard to the wearer when exposed to heat above approximately 260° C. It can soften, melt, drip and occasionally shrink at those temperatures. This can cause unprotected skin to be exposed to the heat source and may set up a thermal barrier which will hold the skin temperature at a higher level for a longer period of time, increasing the severity of a burn. Therefore, uniforms made of this material should not be worn by personnel at high risk of being exposed to intense heat or open flames.

Commanding officers should review the operational environment of their individual commands and determine which personnel are routinely exposed to a risk of fire, explosion or emergency response requirements. Some naval environments, such as aviation and shipboard operations, present a constant threat of fire, where escape may not be an option. Additionally, all hands are responsible for initial firefighting actions when a fire breaks out, regardless of the uniform they happen to be wearing at the time. The ideal of presenting a sharp military appearance should be weighed against the possible hazards that would be encountered if a fire were to occur during a given evolution.

In summary, there is room for, and indeed a need for, both viewpoints concerning uniforms. CNT provides the smartness and uniform presentation that our Navy has needed. But natural fiber work clothing is safer. Once again, the latitude exists in the Navy for commanding officers and individuals to use their own discretion. The purpose of this discussion has been to show both sides and to express our concern for safety.

Commodore Jerry C. Breast

LETTERS

Re: Pressure Altimeter Article

Monterey, CA — Lcdr. Drake's article on pressure altimeters (Oct 83) has some glaring errors which may cause confusion rather than explanation.

First, let's clear up the hydrostatic equation, which is a difference equation.

$dp = -rgdz$ or

$$\frac{dp}{dz} = -rg \quad (1)$$

r = air density
g = gravitational acceleration
p = pressure
z = height

The ideal gas law, which the atmosphere closely resembles, is:

$p = rRT$ or $r = \frac{p}{RT}$ (2)

R — gas constant
T — absolute temperature

Assuming a standard atmosphere, i.e. surface air temperature $T_0 = 15°C$ and vertical lapser rate $L = .0065°C/m$, then

$T = T_0 - Lz$. (3) z — altitude

Using (2) and (3) in (1)

$$\frac{dp}{dz} = -\frac{pg}{RT} = -\frac{pg}{R(T_0 - L_z)}$$

and

$$\frac{dp}{p} = -\frac{g}{R}\,\frac{dz}{(T_0 - L_z)}$$

Integrating and solving for altitude z,

$$z_1 = \frac{T_0}{L}\left[1 - \left(\frac{P_1}{P_0}\right)^K\right] \qquad K = .1903$$

Therefore, the indicated altitude z_1 depends on T_0 sea level temperature, L lapse rate, P_0 sea level pressure and P_1 pressure at z_1. P_1 is sensed by the pressure altimeter; P_0 is the altimeter setting, which is station pressure, converted to sea level (involving another equation and an assumed temperature lapse rate). T_0 and L cannot be adjusted even if they are known. Therefore, these last two factors cause the major errors in pressure altimeters. An exception would be for high altitude airports, where the conversion of station pressure to sea level pressure can cause error.

The second point is the validity of the hydrostatic assumption (eq. (1)). That is, that the pressure is the sum of the air in the column above. It is true that non-hydrostatic conditions exist, however, large vertical velocities are required. If one blunders into such conditions (thunderstorms) slight inaccuracy in the altimeter would probably be the least important consideration of the moment.

Lastly, and admittedly a nit-picking point, Lcdr. Drake's Figure 1 shows an inversion layer some 5,000 feet thick. Wow! Where has he been flying? Normal inversion layers are only hundreds of feet thick.

Wayne A. Sweet
Research Meteorologist
Naval Environmental Prediction Research Facility

• Oops! You caught us. Thanks for clearing things up for our readers. — Ed.

Re: Real Men Don't Wear Gloves

NAS Miramar — Thanks for the article written by Lcdr. Bob McHale entitled "Real Men Don't Wear Gloves." I'm a rigger in a training unit and am always confronted with the problem of reminding aircrew that "Your equipment won't do you any good worn like that, sir." They shrug their shoulders and say it's too uncomfortable. I've tried several tactics to make them think but it seems experience is the best teacher as in your case.

Being in a training squadron, the new aviators acquire all the basic perceptions of what a Navy pilot really is. The more advanced they get, the more they compare themselves with their peers and the less advice they take from their riggers.

Most PRs spend a lot of man-hours ensuring personal flight equipment is in every way by the book. Seeing aviators haphazardly wearing their equipment is very discouraging.

I think PRs have a special kind of relationship with aircrew vis-a-vis other ratings in aviation. Preserving that relationship means good communication.

I hope a lot of aviators take heed to that article because "Dead aviators don't wear gloves!"

PR1 Jacki Hanson
VF 124 PR Shop

Where Have all the Buttons Gone?

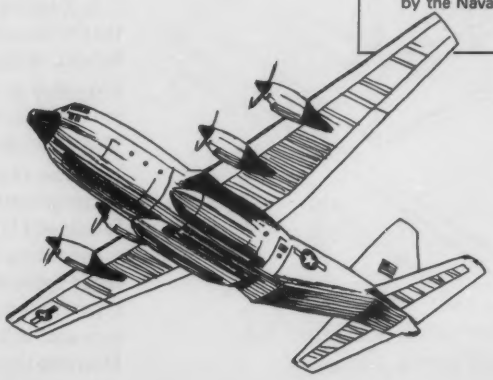
FPO New York — After the introduction of a new brand of dungarees, I soon noticed that the button on the left rear pocket always seemed to wind up missing within a month or two of purchase. While deployed in the USS *John F. Kennedy* (CV 67) last month, I conducted a simple survey. Almost all of the new-looking dungarees I observed were missing the rear button. No one seems to know what happens to these buttons, but many probably end up as FOD.

This could be a serious problem, especially with people working around jet aircraft. I haven't heard of a FOD incident which was blamed on a button, but I know that many are never resolved, and this could be one of the causes. A simple solution would be to bring back the dungarees with no buttons. I don't feel that the buttons are really needed.

AT2 Gary Alderman
VS-22
FPO New York 09501

• This problem is under study. Dungaree owners are advised to have the stitching reinforced or remove the buttons before they become FOD. The Anymouse entitled "Button, Button Who Has The Button" on page 19 addresses this problem also.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: *APPROACH* Editor, Naval Safety Center, NAS Norfolk, VA 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.



"You can either grip the podium tightly or . . ."

How To Be A Good Section Leader

By Lcdr. Gordon A. Henry, USN (Retired)

IT is a well-known physical law that night air conducts sound much more readily than its counterpart. It has also been proven that in spite of its superior sound-carrying characteristics, it does not contain as much lift as day air. Flight through this medium, therefore, requires a great deal more skill on the part of the pilot. As a section leader, you will, in addition to flying your own aircraft in this hostile environment, be required to make your wingman believe that you are comfortable, proficient and self-assured. In short, you must convince him of your ability to get him back alive. The following are a few of the tricks you can use to make the young wingie think you know what you are doing.

- Do not let your hands shake at the brief. You can either grip the podium tightly or keep them in your pockets.
- Brief thoroughly; do not leave anything open to interpretation. Make it clear that you know what you are doing and that you are in charge.
- Explain the rendezvous procedures:

a. Underrunning at night is easy. Explain that you will be on altitude and airspeed plus or minus two feet and one knot and that, without a horizon, he will have to scan his altimeter often, and that his airspeed should be very close to your own.

b. Explain that a running rendezvous is rather risky and that he should ensure a good lateral offset while joining from behind. A bright taillight on the lead aircraft can wash out any other points of visual reference, and depth perception will be nil. Give him a nice conservative guideline for maximum closure speed.

- Always preflight with a flashlight. The wingie will be overwhelmed with your obvious forethought and may even follow suit.
- Taxiing into fire bottles or off the taxiway is usually regarded as bad form, even by nuggets. A more experienced type will consider this type of behavior as totally unsatisfactory and will immediately begin to lose confidence in you. Don't be shy about turning on the taxi light.

"Make it clear that you know what you are doing and that you are in charge . . ."

• Be sure to stop at the end to do takeoff checks. Doing them on the takeoff roll makes the aircraft wobble in a rather unpredictable fashion which may be construed as unprofessional by your trailing playmate.

• As the wingie approaches the final portion of the rendezvous, dim the lights. Be sure you do not turn them off. Even if the situation is rapidly deteriorating, this is no time to hide.

• Flip on the probe light, this will give him a little better look at the attitude of your aircraft, and he'll begin to become grateful for your thoughtfulness. He will relax a bit and may even hear your frantic calls for a radio check.

• While practicing breakups and rendezvous, never break into the wingie. Again, bad form. Be sure to reset your lights after the break.

• Do not give hand signals at night. They invariably result in less than optimim performance by the wingie. Be patient and explain what you want him to do via the UHF.

• During descents into IMC with a no-radio (NORDO) wingman, dirty up on top if fuel permits. Don't make an idle descent unless your aircraft has variable position speed brakes. When you approach about 5,000 feet AGL, reduce the rate of descent a bit. This will prevent the wingie from becoming wall-eyed from trying to watch both you and his VSI.

• Do not descend below 2,500 feet or so until within a reasonable distance of the field. We all know we can hack it, but the wingie gets a little nervous when the low altitude warning, which he has set to minimum descent altitude, keeps going off with 28 miles to go.

• Maintain the lead when you dirty up. You can foil all your wingie's attempts to wrestle the number one position from you by going dirty in the following manner:

a. Call on the radio "Gear and flaps NOW."

b. Lower gear handle and add two to three percent rpm.

c. Wait four to five seconds and lower the flaps.

d. The wingie will simultaneously lower gear and flaps as you told him to in the brief and will be able to stay in position.

• For section approaches, have the wingie drop back a few degrees and step up just a tad. This will enable him to fly formation and to see the runway too. A little step up will also give him the psychological edge of thinking you will hit the ground first! Remember, the wingie may be a little heavier than you, so don't be too quick to fly your own aircraft on speed. An old Indian trick is to watch the wingie's approach light and fly him just a bit fast. After you've dropped him off on the ball, fly your own aircraft. Don't fly into the ground watching your NORDO wingie trying to get it on deck. He broke his radio — let *him* gut it out!

• During the debrief, be sure to nit pick and make it clear that since you got him back alive, he owes you a drink at the club.

"Make it clear that since you got him back alive, he owes you a drink at the club."

By Maj. Mark Mallett
MAG-14 2nd MAW

Black arts and white snow

"IN arctic helicopter flying, there's no black arts involvement; actually all it takes is a knowledge of the "rules of the road," a strong sense of caution and a large set of (for publication purposes) guts." With that bit of profundity the Anglo Wessex pilot returned to the consumption of his pint awaiting more questions or beer from the Colonial (his words) helicopter pilots.

He received both. He was with a United Kingdom squadron training at Bardufoss, Norway, and we were HMM-365 from New River. He was completing three months of Arctic Winter Flight Training, and we were starting 10 days of Arctic Winter Flight Training. So we picked his and his squadron mates' brains, working on the premise, "If you don't know, ask someone who does."

We received a lot of information this way and from various official publications and boiled down, three things held true; CAUTION, GUTS and rules of the road. The first two in Americaneese are called "comfort level," and vary with individual aircrews, but rules of the road are rules, and like NATOPS, can be scribed in stone. Fortunately, Norwegian rules of the road have good road marks:

Mountains. Steep ones with 2 feet of rise to 1 foot of run, from sea level to cherubs, 60 in a click.

Alpine Valleys. Narrow and twisting that run between those mountains.

Snow Storms. Dense and fast moving.

Snow Covered LZs. Champagne powder is what the down hillers call it, but when a hovering helicopter stirs it up it's a snowball.

Norwegians. Who, when they hear a helicopter, go over their house, run outside, see the Stars and Bars, not just a star, and say, "Thank heavens."

Wires, Wires and more Wires. Norway must be afraid the country will come apart at the Fjords. They've got power lines, high tension lines, and really big high tension lines (like 2,000 AGL crossing the Fjords), ski lifts, cable cars and even the farmers use a slide for life device to haul hay down from high meadows.

Gotcha Valleys. Since one Alpine Valley looks like a lot of other alpine valleys, a wrong turn won't lead to your destination but to a box canyon usually with one of those dense, fast moving snow storms in residence.

On top of all these roadmarks, it's TERF time. Military fixed-wing aircraft operate with a floor of 500 feet AGL. So the rotary-wing have a ceiling of 300 feet AGL.

Rule Number One. Never lose sight of a contrasting outside reference. When the weather en route starts to get crummy, get low, get slow, keep something in sight like trees, shoreline, rocks, road or river. A snow field is not a good reference because of whiteout. When it gets too bad, get back, turn around and go home. The standard IFR climb and turn drill is not a red hot idea. Remember the mountains, even if an upclose and personal rendezvous with Mount Hager is missed, that snow's gotta come from somewhere. That's right a cloud, a cloud of supercooled water droplets that'll turn a helicopter into a multi-sticked popsicle.

Rule Number Two. Never lose sight of a constrasting outside reference. When landing, plan to put something like a tree, bush, embark box or runway light under the rotor disk. Put it close in, 6 feet away at a 45 degree bearing and hover the helicopter using it as a reference. Remember the snowball. The helo will now be engulfed in a cloud of snow, no visible horizon, no outside reference except that hover object. Hold the helo absolutely steady, no forward, sideways or turning motions, and slowly lower the collective until it hits the stop.

The struts, skids, cross tubes, antennas and whatever will bury themselves in the snow and the helo will be belly down. Don't plant the helo as the undercarrage will punch through the snow, with no damping effect, and the helo will do a bellyflop. What happens next? Ground resonance! The situation is like having overserviced struts or hard point tiedowns while turning. All it takes is a little bump to turn the helo into a claymore and a bellyflop is a big bump. So softly, softly, gentle that helo into a landing. If the outside reference is lost, wave off immediately. Don't hunt around for it or another. Pull in power and go straight up. Don't try to fly forward out of the snowball. A sudden meeting with a cliff face or a tree line, if not ruining one's whole day, can certainly increase the old pucker factor.

Certain helicopter NATOPS manuals say or have said, "To avoid the rotor downwash induced snow cloud (snowball) from engulfing the helicopter, use variously a run-on, roll-on or no-hover landing." Each of these techniques call for forward motion. Even a no-hover landing allows for up to 5 knots of ground speed. A smooth snow field might contain all sorts of buried goodies like rocks, holes, stumps, logs, ditches, berms, frozen vikings and the helicopters have things which hang down. Last year, a pilot landed in the snow on a roll and invented the folding nose gear. Besides the structural damage and the fact that the nose gear almost wiped out the flight controls, the rotor systems went out of balance from the impact, and the pilot had a merry time getting out of ground resonance, while IFR in a snowball.

Arctic terrain is deceptive. A 30-foot tree seen from air might only be 6 feet high and that smooth level land might have a 15 percent slope. A no-hover landing is a power-off evolution and perceptions of the terrain can trick a pilot. A hover type landing, however, is power-on and when tricked by the terrain, it's a slight yank vice a big yank on the collective to wave off. The Norwegians do execute no-hover landings to a tree or something but with no forward air speed in their ski pad equipped UH-1Bs (nothing below the snow line) and with six months of snow flying before they are considered qualified.

Rule Number Three. Never lose sight of a contrasting outside reference. A lost helicopter is on its way to being a helo in deep kimchee. There's the Gotcha Valleys and the wires as well as neighboring Sweden and Finland, and penetration no matter how slight will earn a pilot lots of high level attention. Now Norway is pretty well blanketed with VHF Flight Service stations that can give a DF steer to those few who can talk to them. For the rest of us, it's VFR Navy, finger on the map, call out the upcoming obstacle and know where you are. During the snow showers, fly point to point, "OK, I see the bridge, when I get there, if I can see the power lines I'll continue, otherwise . . . . "

Rule Number Four. Never lose sight of a contrasting outside reference. When it starts to go white outside, land preferably near civilization like a highway, house, school or business. If the delay is over in a half hour, get to a phone and call home. Norwegian ATC keeps close track of all flights and with a half-hour delay in an aircraft's ETA, it launches the SAR. The Norwegians are friendly and will probably give the crew a warm place to sit and a cup of coffee. Remember if it looks bad, land. We even had our CO land with an external load still attached to wait out a snow storm.

Rule Number Five. Never lose sight of a contrasting outside reference. On takeoff this rule gets a little bent but bending is minimal. The landing snowball will return when the pilot pulls in takeoff power. It's pull a little power, see that the gauges are winding up, then honk up on the collective maintaining takeoff nose attitude and wings level. At about 40 feet the snowball will thin enough that the outside reference is regained, transition to forward flight and back to rules one through four.

Flying under these rules is demanding and leads to personal satisfaction and pride which of course leads to hangar flying and sea stories. I mentioned a particular story to an A-6 pilot and a pilot who had flown UH-1Ns with VXE-6 in Antarctica. The tale was of a Norwegian UH-1 pilot who got caught in an industrial strength snow storm and air-taxied down a road using snow plow stakes as his contrasting outside reference until he found a cleared area to land in. The fixed wing pilot was horrified at such a departure from standard inadvertent IFR procedures. But the helo pilot stated that he'd done the same thing on the ice using crevasse flags vice snowplow takes. This and other comparisons brought out that flying over snow and ice is pretty much flying over snow and ice, be it Malangenfjorden or Marie Byrd Land, The rules of the road hold true.

To paraphrase the statement made by Her Majesty's finest: There's no magic involved, Arctic helicopter flying is operating to the aircrew's comfort level, not going where Norwegians fear to tread and obeying the rules of the Far North. Of course it helps to have a rabbit's foot, horseshoe or four-leaf clover in the cockpit. ◄

Lt. Randy Horner (right),
Lt. Scott Grundmeier (left).

Lt. Randy Horner
Lt. Scott Grundmeier
VF-143

MEATBALL, line-up and angle-of-attack, normal flight within these parameters will usually get you aboard. When done well, you'll probably score an "OK, three wire." For Lt. Randy Horner and Lt. Scott Grundmeier, however, the "OK three wire" was theirs only momentarily.

Following touchdown and initial trap deceleration aboard *USS Dwight D. Eisenhower* in their F-14 Tomcat, both crewmembers realized something was wrong. Sensing what felt like a slower than normal bolter (actually a purchase cable failure), Horner's reaction was to set a flying attitude and continue to fly the Tomcat. Noting that their airspeed was 110-112 knots and minimum flying speed was 108 knots, Grundmeier prepared for ejection. However, Horner flawlessly recovered from the *extremis* situation, transmitted to his RIO, "I've got it; we're OK" and successfully boltered.

Due to the possibility of having sustained damage to their tailhook, the crew was instructed to divert. They commenced a bingo profile to Cairo West airfield, Egypt. When 110 miles from the divert field, the low fuel warning lights illuminated. Faced with low fuel and an approach to an unfamiliar field, the crew continued to exhibit composure and professionalism performing an uneventful landing.

Through superb airmanship, outstanding situational awareness and excellent crew coordination, this fighter crew saved a valuable F-14 from a watery grave.

BRAVO ZULU

Cdr. Rob Weber, Commanding Officer
Ltjg. Tom Lindberg
Lt. Marc Troiani
VAQ-132

OPERATING from *USS Dwight D. Eisenhower* (CVN 69) in their EA-6B, Cdr. Rob Weber, VAQ-132 CO, and crewmembers Lt. Marc Troiani and Ltjg. Tom Lindberg were 15 minutes into a routine surface search mission with all systems normal. Following a level-off at 10,000 feet, Weber secured the auto function of the automatic flight control system (AFCS). The aircraft made an immediate, uncommanded roll to starboard. After an estimated three to five seconds, Weber managed to return the aircraft to level flight with 50-60 pounds of lateral stick pressure and large rudder inputs. The emergency AFCS disconnect was actuated and the appropriate circuit breakers pulled. All lateral flight control inputs by the pilot were met with constant, rapid fluctuations of pressure to the stick.

Realizing the nearest divert field was more than 200 miles away, the pilot requested the carrier for an emergency pull forward. The aircraft was slowed to 200 KIAS for a straight-in landing. As the aircraft was slowed to approach speed, lateral, uncommanded stick fluctuations increased and considerable stick force was needed to dampen lateral control movements. Prior to touchdown, Weber was forced to use large rudder inputs, due to minimal lateral control with the stick, to maintain aircraft lineup. Upon touchdown, the control stick slammed over hard to the right and stayed there until the engine was secured.

Postflight inspection revealed an internal malfunction of the AFCS actuator. Weber and his crew handled this critical situation in a calm, professional manner. Their superb airmanship averted the loss of an extremely valuable fleet asset.

Cdr. Rob Weber (right), Lt. Marc Troiani (center), Ltjg. Tom Lindberg (left).

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A Failure to Communicate	SEP	16
A Flock of Birds	NOV	6
"Your Nose Gear is Down But Not Locked, and Your Main Gear Did Not Come Down!"	NOV	7
Hard Knocker	DEC	28
F-14		
A Buzzing and a Grinding	FEB	7
Stung By the Stinger	MAR	20
X-Winged Tomcat	APR	16
Bravo Zulu	JUN	24
X-Winged Fighter Again	JUL	10
Flat Spin In an F-14	JUL	20
Bravo Zulu	AUG	26
A Question of Attitude	NOV	23
One of Our Mainmounts Is Missing	DEC	6
F-18		
Direct Hit, On Fire, Eject!	MAY	26
P-3		
Crew 10 to the Rescue	JAN	10
A Hurricane by Any Other Name	JAN	20
Interior Noise Levels in the P-3C	FEB	8
NATOPS Violations	FEB	15
Engine-Out Landing Techniques	APR	18

Wrong Time For ZZZs MAY 24
Ready to take off? Ready to not take off? OCT 10
Aircraft Evacuation: What Now? NOV 15
Sliding Into Home Plate NOV 32
An Icy Nightmare DEC 10

S-3
Distracted ASO APR 7
Situation? S-3A Blue Water Operations APR 22
Bravo Zulu JUL 26
The Invisible Splash AUG 16

SH-2F
The Night the Lamps Go Out JUL 2

SH-3
CAMPing and FRYing (Attaboy) FEB 7
MOB Scene JUN 14
Single-Engine Save AUG 6
Sucking Air SEP 5
Know Thy Aircraft SEP 12
Bravo Zulu OCT 11

T-2
Portable two-way radio, where are you? JAN 12
A Fatal Near Midair JAN 16
Bravo Zulu FEB 10
Bravo Zulu MAR 26
Fledgling Flier's Flawed Flight JUL 7
Bravo Zulu NOV 25

T-2F
Bravo Zulu JAN 15

T-34
The Errant Parachute NOV 7
What Does It Mean to Get Tight? NOV 20

TH-1L/UH-1N/AH-1T
Bravo Zulu FEB 11
A Walk on the Wild Side APR 24
Why Plan When You Can React? APR 30
Risking a Crew and an Aircraft OCT 12

Carrier Operations

Into the Island (EA-6B ejection off the catapult) JAN 18
Talk About a Breakdown (A-7 communications) FEB 6
A Wild Ride (CH-46 mishap) FEB 26
Into the Island (EA-6B ejection) MAR 2
Stung By the Stinger (F-14 tailhook/stinger separation) MAR 20
Chain Lightning (helo tiedown chain mishap) MAR 22
A Final Approach (A-7 fatal mishap) APR 8
X-Winged Tomcat (flawless emergency trap) APR 16
Situation? S-3A Blue Water Operations APR 22
Heat Shadow (rare carrier deck phenomenon affecting helos) MAY 20
Two Seconds From Eternity JUN 16
Monday Morning Quarterbacks (EA-6B ejection) JUL 8
X-Wing Fighter Again (F-14 with asymmetric wing sweep) JUL 10
Tiedown Chain Hazard JUL 19
Low, Red and Deadly JUL 30
Who Wants the Cod? (cut lights mean "cut" to a prop) JUL 32
A Moment's Inattention (A-7 over the side) JUL IBC
Shock Value AUG 24
A Failure to Communicate SEP 16
A Modest Proposal (recovery briefing for LSOs) SEP 17
Blue Water Barricade Landing (KA-6D) OCT 5
A Piece of Cake OCT 7
No Room For Error DEC 6
Helos Are Health Hazards Too (on the flightdeck) DEC 14
Boarding Rate in the Proper Perspective DEC 16
"Plane in the water, plane in the water!" DEC 23
Hard Knocks (a Bingo emergency) DEC 28

Facilities and Ground Operations

The Missing 7,000 (safety checks for 15-pound fire extinguishers) JAN 9
Portable two-way radio, where are you? (near FOD incident) JAN 12
Nuggets Can See, Too! (runway obstruction) FEB 15
P-3 NATOPS Violation FEB 15
"All Aircraft in the Whidbey Pattern" (NOTAM on runway change) MAR 19
Safe-T-Line (attaboy NAF Washington transient line) APR 6
Birds Demand Equal Rights to Airspace APR 21
A Walk on the Wild Side APR 24
Flap Up (takeoff checklist incident) MAY 25
When You're Losing Your Bearings (pick up on duty runway) JUL 18
Leaving the Door Open (A-6E preflight incident) AUG 7
Wet Runway, Take the Gear! SEP 10
Aircraft Evacuation: What Now? NOV 15
One of Our Mainmounts is Missing (F-14) DEC 6
Dressed for the Occasion (wearing of safety apparel) DEC 12

Flight Gear and Survival

Crew 10 to the Rescue JAN 10
A Turn For the Worse JAN 10
Into the Island JAN 18
Immersion Hypothermia and Ditching FEB 16
You're On Fire, Eject! FEB 30
The "Proper" Use of Life Support Equipment APR 26
Two Seconds From Eternity (EA-6B ejection) JUN 16
Double Flameout or How to Ruin a Box Lunch (H-46 ditching) JUN 26
The Night the Lamps Go Out JUL 2
Flat Spin in an F-14 JUL 20
SPINTAC Strike (TA-7C) AUG 8
"Real Men Don't Wear Gloves" (A-6 crew water survival) SEP 2
The Repeat Customer (preflight your flight gear) OCT 11
The Errant Parachute (T-34C) NOV 7
Blue Water SAR NOV 16
Minimum of Inspection, Minimum of Survival (liferafts) NOV 19
Just when you thought it was safe to eject over water . . . (TA-4) NOV 26

Instrument Flying and Navigation

A Few Dark Minutes (CH-53 near ditching) FEB 28
Memories Worth Their Weight in Life (F-4 gyro failure) MAR 13
Those Poor Devils (emergency in a civil aircraft) MAR 14
Clouds, Mountains, A Green Windscreen (a case of helo press-on-itis) JUN 28
Out on a Limb (get-home-itis in an A-7) JUL 22
"You have 25 miles to run, cleared for the approach!" JUL 24
The Invisible Splash AUG 16
Running on Empty AUG 20
What If . . . SEP 6
More Than You Ever Wanted to Know About Your Pressure Altimeter OCT 8
Declare the Emergency (TA-4J mishap ejection) DEC 8

Maintenance

People Who Live In Glass Houses (inefficient RAMEC system	MAR	6
The Wrong Tack (F-4 fuel system incident)	MAR	7
Distracted ASO (S-3)	APR	7
Hold Your Breath (night TA-7 ejection)	JUN	12
Pitch Pack Panel Plunge (A-7E panel loss)	JUL	6
Fledgling Flier's Flawed Flight (T-2C fueling mishap	JUL	7
Accolades For Triple H (A-7E jammed controls)	JUL	7
Nose Tire Hazard (A-3 tire deflation hazard)	JUL	19
Canopy Closure Incident (KA-6D)	AUG	6
No Action Taken (maintenance error unreported)	DEC	15
Probable Cause (E-2 flameout/bogdown problems)	DEC	20
Corrosion Word Search	DEC	32

Midairs and Near Midairs

Bending a Waiver (EA-6B/Cessna near miss)	JAN	11
A Fatal Near Midair (T-2C departure)	JAN	16
CH-46 vs Army Helos	FEB	6
Night Tanking Midair (A-7)	MAR	16
Direct Hit, On Fire, Eject!	MAY	26
Refueling Nightmare (A-3/KC-130)	JUN	15
Midair With a Destroyer	AUG	18

Miscellaneous

1982 Approach Index	JAN	26
Real Aviators Don't read NATOPS (humor)	JAN	28
Not Even A Good Guess (aircraft disappearances)	FEB	2
Why Plan When You Can React? (UH-1 fuel management)	APR	30
1982 CNO Safety Award Winners	MAY	7
1977-1981 World Class A Mishap Locator Map	MAY	16
1983 Approach Reader Survey	MAY	29
Skyhawks in Flames	MAY	31
Anymouse Is Alive — Not Dead	JUL	15
An Interview With the Honorable John F. Lehman, Secretary of the Navy	AUG	2
Switches That Bite in the Night	SEP	8
Interview With Capt. Thomas K. Mattingly II USN, NASA Astronaut	OCT	2
A Pilot Sings the Blues (humor)	OCT	15
Banana Time (Simian cargo — (humor)	NOV	6
Saga of Lt. CANDOO HACKITT (humor)	NOV	30
Reflections on 1983 Approach Reader Survey	DEC	IFC
The Homecoming	DEC	13
Bigger Is Not Always Better (battery hazard)	DEC	15

Safety Programs and Philosophy

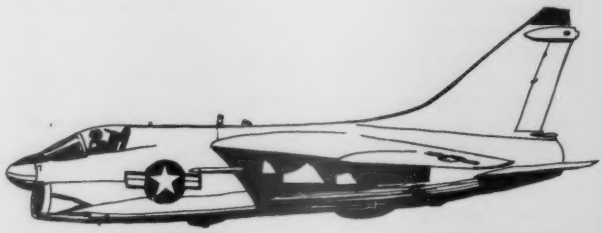
Mishap-Free Flying . . . Is There a Formula	JAN	24
Looking the Other Way Doesn't Pay (A-7 tankers flying ACM)	FEB	21
A Flash of Yellow Flame	FEB	24
Risk and the Naval Aviator	MAR	10
War Stories (how to pass on experience)	APR	10
So You Want to be a Mission Commander?	APR	14
Safety is for Sissies or Real Men Eat Quiche	APR	29
MASH III (an indepth look at 1982)	MAY	2
When the Pressure Is On (the decision to fly or not is yours)	MAY	32
The NATOPS "Bible" Myth ("they" don't write NATOPS — we do)	JUN	8
Toward a Better Safety Program	JUN	29
Tomorrow May Be Too Late (don't let "routine" ops bite you)	JUN	31
Somebody's Out to Kill You	JUL	18
The "I Can Hack It Syndrome"	JUL	25
It Looked Like All the Rest (H-53 power settling)	AUG	28
"Watch Out for Number One . . ." (winning the safety "S")	SEP	4
What If . . . ? (EA-6B night emergency)	SEP	6
The Salt On Your Wings (building standards)	OCT	IFC
What Went Wrong? (A-4 fatal during close air support)	OCT	6
Risking a Crew and an Aircraft	OCT	12
Cheating Ourselves	NOV	IFC
C-1 Oxygen Impasse	NOV	18
A Question of Attitude (F-14 mishap)	NOV	23
Safety Word Search	NOV	29
Expediency (an attitude that comes in many disguises)	DEC	2
Is It Safe?	DEC	18
It'll Make It (is it worth the risk?)	DEC	26

Training

Are You Ready For This? (Marine helo simulators)	APR	2
P-3 and C-130 Engine-out Landing Techniques	APR	18
Simulated Reality (HH-46 incident)	MAY	18
MOB Scene (SH-3 mishap)	JUN	14
How to Fight the Delta Doldrums and Free Play Fever	JUL	28
How Not to Win Friends (loading flammable/toxic materials on a C-2)	AUG	6
Feast or Famine (a helo emergency)	SEP	11
Know Thy Aircraft (inadequate flight preparation in helos)	SEP	12
Ready to take off? Ready to not take off?	OCT	10
The Harrier II Arrives	NOV	2
Crash Course — An Aircraft Mishap Mini-Drill	NOV	8
Hands Off (jungle penetrator training incident)	NOV	18
What Does It Mean to Get Tight?	NOV	20
IP Follies or How to Read a Student's Mind	DEC	30

Weather/All Weather Operations

Blueprint for Disaster (wind shear)	JAN	2
A Hurricane by Any Other Name (P-3 in high winds and blowing snow)	JAN	20
Blind Date (A-7 trying to fly VMC in IMC)	MAR	28
Why? (C-1 trying to fly VMC in IMC)	APR	5
The Answer is in the Wind (microbursts and you)	MAY	8
Wind Shear . . . the Experiments Continue (microburst photo feature)	MAY	14
Lightning and Naval Aviation	JUN	3
Elmo, the Patron Saint of Night Tanker Crews	JUN	11
If there is doubt, there is no doubt! (when doubt about the weather exists, don't go)	JUN	23
Sliding Into Home Plate	NOV	32
An Icing Nightmare	DEC	10



Don't curse the darkness, use your flashlight.

Be extra careful when crossing the flight deck at night.

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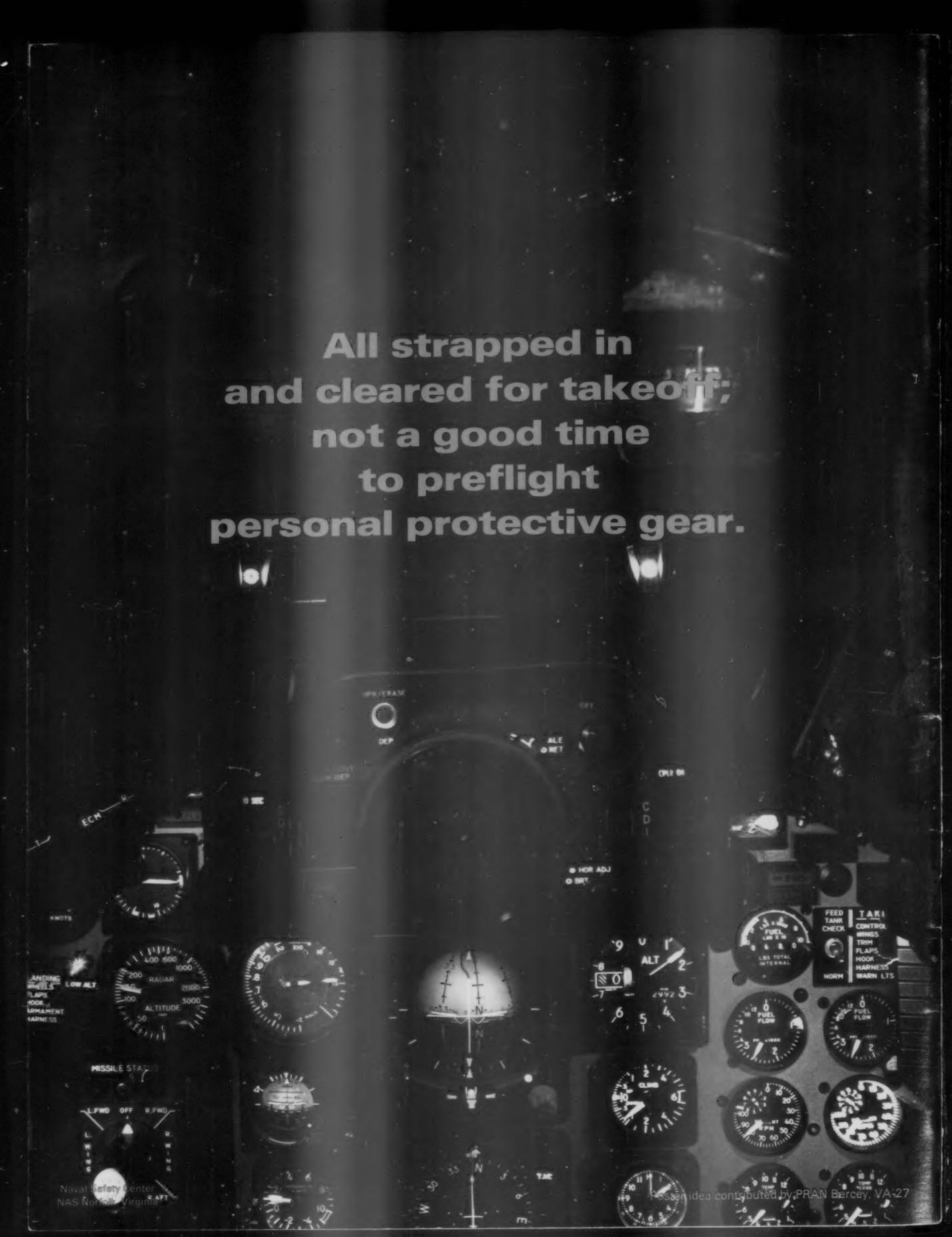

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Poster idea contributed by PRAN Bercey, VA-27